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ABSTRACT

This curriculum guide, one of six modules keyed to the building maintenance competency profile developed by industry and education professionals, provides materials for a masonry procedures unit containing eight lessons. Lesson topics are masonry safety practices; set forms; mix concrete; patch and/or repair concrete; pour and finish concrete; mix mortar; remove, repair, replace brick and block; and install masonry anchors. Each lesson includes some or all of the following color-coded components: performance objectives, information sheets, transparency masters, handouts, assignment sheets, job sheets, lesson tests, and answer key. (YLB)

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Instructor's Guide

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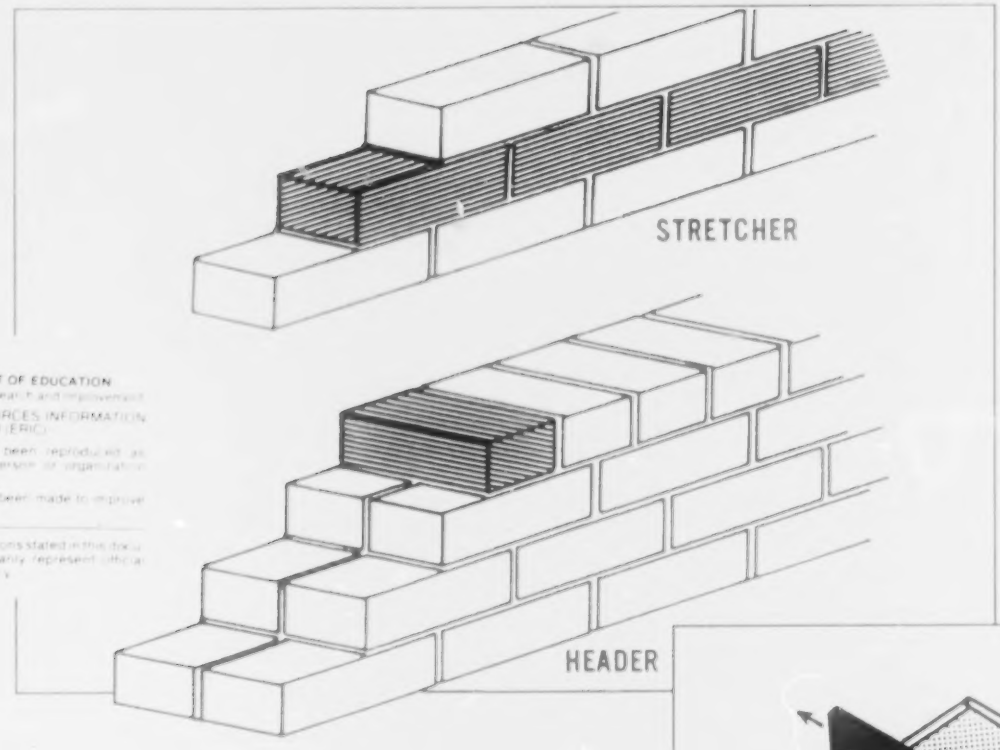

Module V

Masonry Procedures

ED 325698

BUILDING MAINTENANCE

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Plumbing Procedures

Electrical Procedures and Environmental Control Systems

Masonry Procedures

Grounds Maintenance Equipment and Procedures

The activity which is the subject of this report was supported in whole or in part by funds from the Department of Elementary and Secondary Education, Division of Vocational and Adult Education. However, the opinions expressed herein do not necessarily reflect the position or policies of the Missouri Department of Elementary and Secondary Education or the Division of Vocational and Adult Education, and no official endorsement should be inferred.

BUILDING MAINTENANCE

Module V: Masonry Procedures

prepared by

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May 1990

Instructor's Guide
Catalog No. _____

FOREWORD

We are indebted to the teachers and administrators who have provided their time, effort and professionalism to the development of this guide. This guide is an outstanding example of what can be accomplished when the right people with the right attitude get together. The curriculum writers and subject matter experts who worked on this guide are to be commended for a job well done.

The Vocational Instructional Management System (VIMS) has become Missouri's framework for competency-based instruction; therefore, the Building Maintenance Curriculum Guide is designed to be totally integrated with the VIMS system. A curriculum guide is more than a resource--it is an integral part of the management system. Its purpose is to guide and facilitate competency-based instruction to help classroom teachers manage instruction.

The format of this guide has been set up for competency-based teaching and testing. Unit tests evaluate specific competencies and can be used with the Vocational Administrative Management System (VAMS). All information sheets, transparency masters, job sheets, assignment sheets and test items are keyed to specific competencies. A cross reference table has been included to quickly identify parts of the curriculum that relate to specific competencies. The material has also been packaged for students.

Competencies are stated prior to instruction and the student knows what the basis for evaluation will be. Each student is thus held responsible for mastering the competencies. The basis for grading is attainment of competencies rather than measurement against other students.

Although this guide may be a new format and new system for many teachers, we are confident that, when used as designed, time spent by teachers and students will become more productive. Any future building maintenance curriculum modifications will begin with this guide. We will evaluate the need to update this guide on a module-by-module basis. Your suggestions regarding areas for improvement are both encouraged and appreciated.

Judith Moore, Supervisor
Industrial Education
Department of Elementary and Secondary Education

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ACKNOWLEDGEMENTS

This building maintenance guide represents a continuing commitment to Missouri's Vocational Instructional Management System (VIMS). The guide has been keyed to the building maintenance competency profile developed by industry and education professionals in the state.

When searching for current building maintenance materials to adopt or utilize in the guide's development, comparable materials were found from the Occupational Curriculum Laboratory of East Texas State University and the Curriculum and Instructional Materials Center of Stillwater, Oklahoma. These materials have been utilized as a resource for this guide. A debt of thanks is owed to the Occupational Curriculum Laboratory and the Curriculum and Instructional Materials Center for the research and development of these building maintenance materials.

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TABLE OF CONTENTS

MODULE V: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

Lesson 1: Masonry Safety Practices.....1
Lesson 2: Set Forms.....33
Lesson 3: Mix Concrete.....61
Lesson 4: Patch and/or Repair Concrete.....77
Lesson 5: Pour and Finish Concrete.....87
Lesson 6: Mix Mortar.....125
Lesson 7: Remove, Repair, Replace Brick and Block.....141
Lesson 8: Install Masonry Anchors.....177

COMPETENCIES ADDRESSED IN THIS MODULE

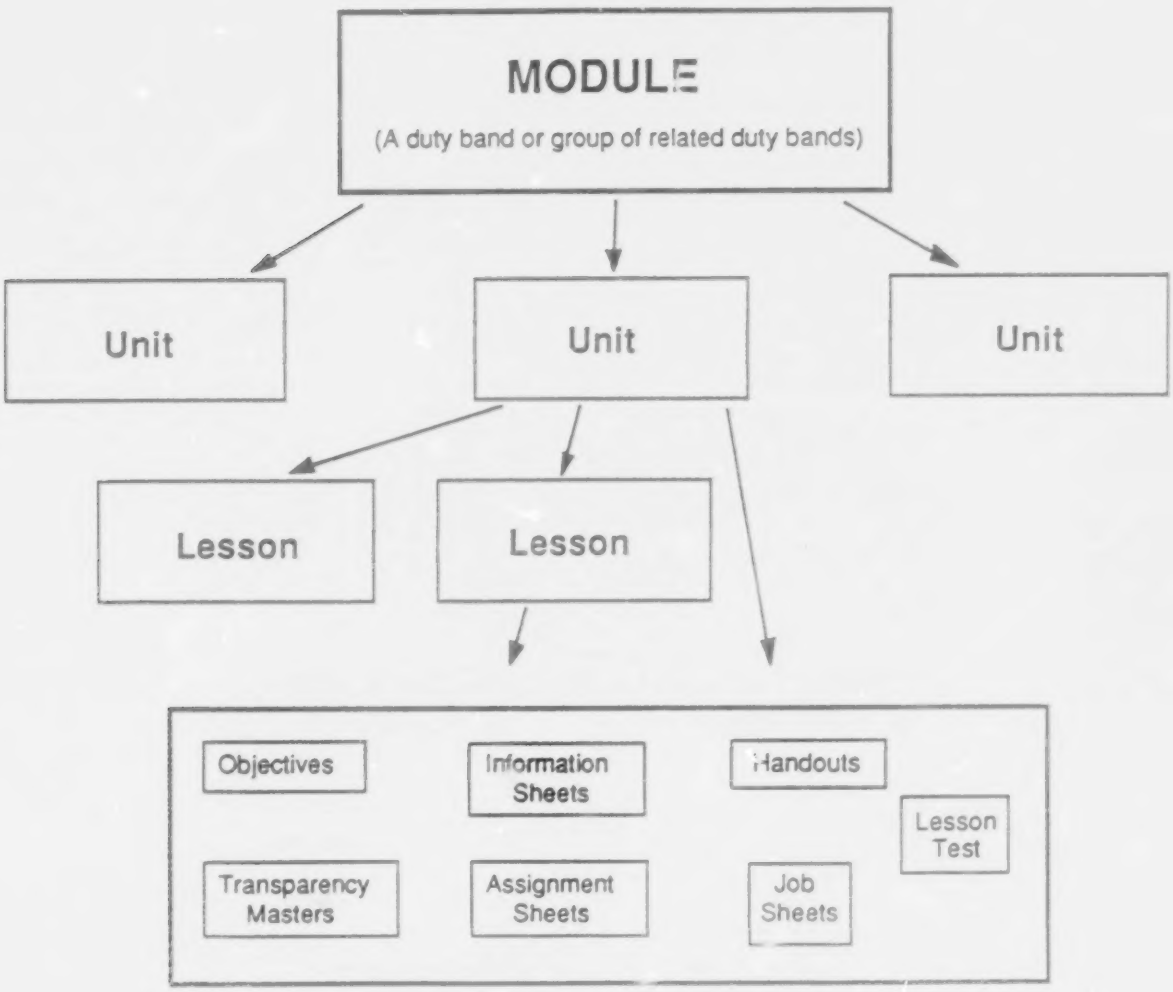
1. Identify masonry safety practices
2. Set forms
3. Mix concrete
4. Patch and/or repair concrete
5. Pour and finish concrete
6. Mix mortar
7. Remove, repair and/or replace blocks
8. Remove, repair and/or replace bricks
9. Install masonry anchors

HOW TO USE THIS PUBLICATION

GUIDE COMPONENTS

Units of Instruction

This Building Maintenance guide contains six modules of instruction. Within each module are instructional units including some or all of the following components: performance objectives, information sheets, transparency masters, handouts, assignment sheets, job sheets and lesson tests.



Competency profile

On the Missouri competency profile, tasks are divided into general subject areas, or duty bands, which are identified by a capital letter. Under each duty are related tasks (competencies), which are identified by an Arabic numeral. To evaluate the student's performance of the competencies, a 3-2-1-N grading system is used where:

3 = **Mastery**--can work independently with no supervision
2 = **Requires supervision**--can perform job completely with limited supervision
1 = **Not mastered**--requires further instruction and close supervision
N = **No exposure**--no experience or knowledge in this area

Cross-reference table (color-coded white)

Once the numbering system is understood, this table quickly reveals how the instructional components of the module relate to Missouri competencies. On the competency profile, tasks are divided into general subject areas, or duty bands, which are identified by a capital letter. Under each duty band are related tasks (competencies), which are identified by an Arabic numeral.

On the cross-reference table, unit numbers are represented by Roman numerals (I, II, III, etc). Other components of the module (transparencies, handouts, assignment sheets and job sheets) are shown with Arabic numerals. By looking at the cross-reference table, the instructor can quickly determine what test questions or job sheets a student needs to receive an evaluation for on a particular competency.

Objectives (color-coded white)

Each unit is based on performance objectives which state the measurable unit and specific behavioral or performance objectives that students are expected to achieve. Since the objectives of the unit provide direction for the teaching-learning process, it is important for the teacher and students to have a common understanding of the objectives and how they are intended to be used. Teachers should feel free to add/adapt objectives which will fit the material to student and community needs. Supporting material will, of course, need to be added for any new objectives.

Table of contents, references (color-coded white)

These pages have been coded pink for instructor use only. The reference section lists materials used as sources in developing the material.

Information sheets (green)

Presented in outline form for clarity, these pages provide content essential for meeting the cognitive (knowledge) objectives in the unit. Students should study the information sheets before class discussion or completion of assignment sheets.

Transparency masters (white)

Transparencies provide information by visually reinforcing or clarifying ideas presented in the information sheets. They are effective when identification is necessary and when they direct the student's attention to the topic of discussion. Transparencies should be left on the screen only when topics shown are under discussion.

Handouts (white)

Whenever more detailed information than can be presented in a transparency is needed, a handout is used. Handouts give the students additional information that can be kept with their class notes or student references.

Assignment sheets (tan)

Assignment sheets furnish paper-and-pencil practice to develop the knowledge necessary as a prerequisite to skill development. They can be given to students for class completion or used as homework assignments. Answer sheets (color-coded pink) can be used by the student or instructor to check progress.

Job sheets (blue)

These evaluation instruments are provided for two purposes: to outline steps of procedure and to check student performance mastery. Job sheets begin with a list of tools and materials needed for the activity. Job sheets furnish potential employers with a picture of skills being taught and performance which might be reasonably expected from a vocational student. The spaces to the right of the page on a job sheet assist the instructor in evaluating a student on a particular activity. This 3-2-1-N grading system is the same as the one used on the competency profile.

Lesson test (yellow)

Competency-based tests are designed to help eliminate subjective testing and to improve student evaluation and accountability. Specific competencies and test questions are linked on the answer key. These lesson tests have been written to be used with

computerized VAMS (Vocational Administrative Management System), utilizing Scantron sheets for computer-recording of test answers.

The lesson test may be eliminated if the competency was thoroughly evaluated by job sheets. However, an emphasis should be placed on cognitive as well as performance skills. If the objective or competency will be evaluated by a job sheet, it is often necessary to determine by a written test whether the student understands enough of the material to perform the job sheet.

SUGGESTED ACTIVITIES

The following list of suggested activities may be helpful.

1. Provide students with objective sheet and information sheets.
2. Discus specific objectives.
3. Discuss information sheets, assignment sheets and/or job sheets, lesson-by-lesson.
4. Have students do assignment sheet(s) to satisfactory levels.
5. Give students lesson test.
6. After successful completion of the test, have students do job sheet(s).

Students should perform the following activities.

1. Read objective sheet.
2. Study information sheets.
3. Do assignment sheet(s).
4. Take lesson test.
5. Do job sheets.

PACKAGING

This Building Maintenance guide has been packaged with an entire class in mind. For the teacher, a complete instructor's guide contains all six modules. In the student reference, selected portions have been reproduced for student use (objectives, information sheets, handouts). Student work sheets (assignment sheets, job sheets, lesson tests) have been packaged together for student distribution as the instructor deems necessary.

In the student reference, page numbers do not run consecutively because some pages have been removed that appear only in the instructor's guide.

Building Maintenance

Module: Masonry Procedures

Cross-Reference Table of Instructional Materials

Competency	Unit	Instructional Objective	Transparency Master	Handout	Assignment Sheet	Job Sheet	Test Item	Notes
H-1	I	1.1-1.4	1-6		2		1-31	
H-2	I	2.1-2.3	1-6			2	1-8	
H-3	I	3.1-3.8				1	1-35	
H-4	I	4.1-4.2				2		
H-5	I	5.1-5.3	1-4		1	2	1-26	
H-6	I	6.1-6.4	1			1	1-26	
H-7	I	7.1-7.9	1-5			1-4	1-34	
H-8	I	7.1-7.9	1-5			1-4	1-34	
H-9	I	8.1-8.4	1-4			2	1-10	

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 1: MASONRY SAFETY PRACTICES

LESSON OBJECTIVE

After completion of this lesson, the student will be able to IDENTIFY THE TYPES OF JOBS AND THE SAFETY PRACTICES ASSOCIATED WITH MASONRY. Mastery will be evidenced by satisfactorily completing assignment sheets and by scoring _____ percent on the lesson test.

SPECIFIC OBJECTIVES

In completing this lesson, the student will:

1. Match terms associated with masonry occupations to the correct definition.
2. Point out the nature of work involved in masonry occupations.
3. Identify the types of jobs associated with masonry occupations.
4. Select the correct safety rules to be followed when using masonry tools and equipment.

Completion of the requirements of this lesson fulfills competency H-I of Building Maintenance.

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PRACTICES

LESSON 1: MASONRY SAFETY PRACTICES

CONTENTS OF LESSON

A. Objectives

B. Information outline

C. Transparency masters
   1. Develop a safety attitude
   2. Keep hand tools in place
   3. Be sure scaffolds are secure
   4. Keep your hands away from turning mixers
   5. Clean up spilled gasoline
   6. Keep a firm grip

D. Assignment sheets
   1. Develop a safety idea
   2. Identify hand tool dangers

E. Lesson test

F. Answers to lesson test

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 1: MASONRY SAFETY PRACTICES

INFORMATION OUTLINE

I. Terms and definitions

A. Caustic--any material that can cause burns by chemical reaction, such as an acid

B. Cement--a powder made of lime, gypsum, iron ore, alumina, and silica; used in making concrete

C. Concrete--a mixture of cement, sand, and gravel that will harden when mixed properly with water

D. Lime--a caustic material used in making mortar mix

E. Masonry--a term that refers to anything made of stone, concrete, brick, or tile materials

F. Mortar mix--a material containing lime that is used to bond brick or stone

G. Muriatic acid--an acid combined with water that is used to remove dried mortar from masonry walls

H. Precast--a concrete product that is poured at a plant in a form or mold and then delivered to the construction site

I. Plaster--a much-made cement, clays and other materials used to produce durable exterior or interior wall finishes

J. Terrazzo--a masonry product made of different sizes and shapes of flat marble stones that are set unevenly in concrete

II. Nature of work--masonry occupations

A. Involves working on jobs with just a few people, or on large construction jobs with many people

B. Provides jobs that involve a lot of "headwork" when compared to those that require skilled "handwork"

C. Offers job opportunities that require either specialized workers or those who can do a number of different jobs

D. Offers a broad range of occupational choices
   1. Residential construction
   2. Commercial construction
   3. Ready-mix plants
   4. Precast products plants
   5. Building repair or maintenance
   6. Business ownership

E. Requires the use of many hand tools and some power equipment

F. Requires physical work, both inside and outside of buildings

   (Note: Jobs such as brick masons and cement finishers depend on the weather for working time)

G. Depending on the place of employment, working hours can vary from 40 to 60 hours weekly

H. Differences in salaries at various locations or on different types of jobs

   (Note: Since many masonry-related jobs are seasonal, a good hourly salary does not always insure a good yearly salary)

I. Offers limited benefits, such as vacations, insurance, and retirement

III. Types of masonry jobs

   (Note: Most construction workers will specialize in only one or two types of masonry work)

A. Cement finisher--pours concrete into forms and produces the required finish

   (Note: Some finishers will build forms and place reinforcement steel in forms)

B. Brick mason--constructs walls or structures of brick, concrete block, or other masonry materials

C. Precast-product plant worker--sets up molds and forms to pour products such as beams, road pipe, stepping stones, and other concrete products

D. Ready-mix plant worker--operates heavy equipment and machinery to prepare cement, sand, and gravel in making concrete that is delivered to a construction site

E. Plasterer--applies cement plaster to building surfaces as a finish coat or to provide a surface on which to apply tile or terrazzo

(Note: This job may also be called a tile setter)

F. Building maintenance mason--mixes and applies mortar to cracks in masonry walls and concrete surfaces

(Note: Some maintenance workers may be required to set up forms and pour larger concrete projects)

IV. Safety (TM 1, TM 2, TM 3)

A. Masonry hand tools
1. Be aware of sharp edges on hand tools such as trowels
2. Remember that brick hammers are made of hardened steel and can shatter if struck too hard
3. Striking tools with hardened surfaces against other hardened surfaces will cause damage
4. Return all hand tools to their proper place after use

B. Equipment
1. Mortar stand
   a. Should be placed within easy reach of the mason
   b. Should be set up so it is level and steady
   c. Should be loaded correctly to prevent overloading on an edge or at the end--which can cause the stand to fall
2. Scaffolds
   a. Should be strong enough to hold the worker, mortar and bricks safely
   b. Should be secured to prevent tipping
   c. Should be loaded correctly to prevent overloading on an edge or at the end
3. Wheelbarrow
   a. Helps prevent back strain when used to move heavy loads
   b. Tips over easily if overfilled

C. Personal safety equipment
1. Hard hat--protects head; should ALWAYS be worn when doing masonry work
2. Steel-toed shoes--protects feet from injury caused by dropping hard objects

3. Safety glasses--protects eyes--should be worn when using a masonry saw
4. Rubber gloves--protects hands from acid burns

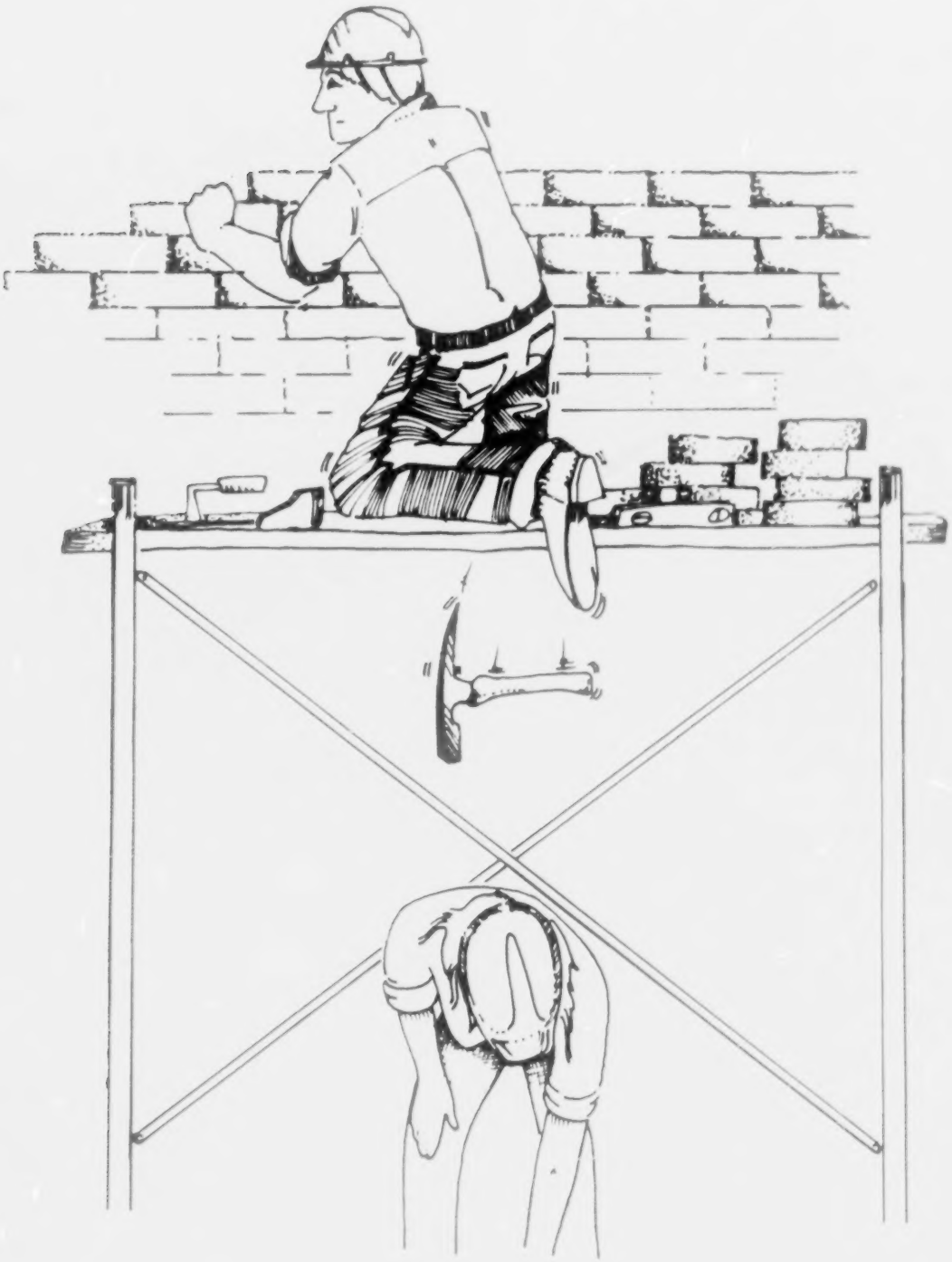
D. Power equipment (TM 4, TM 5, TM 6)
   1. Masonry saw
      a. Always wear eye protection when using a masonry saw
      b. Keep hands away from blade while power is connected
      c. Check electric cord for frayed or bare wires
   2. Electric mortar mixer
      a. NEVER place hands in a turning mixer
      b. DO NOT put a shovel or any other object in a turning mixer
      c. Check electric cord for frayed or bare wires
      d. Stay clear of pulleys, belts, and gears
   3. Gasoline-powered mixer
      a. ALWAYS fill gasoline tank while in an open area
      b. DO NOT start the motor if gasoline is spilled on the engine--wait until gasoline has evaporated
      c. Move gasoline can away from mixer before starting motor
      d. DO NOT put hand or any object into a mixer while it is turning
      e. Stay clear of pulleys, belts, and gears
   4. Power trowel
      a. DO NOT tie the switch at the ON position so that it cannot automatically turn off
      b. Keep a firm grip on the handles at all times
      c. DO NOT start the motor if gasoline has been spilled--wait until gasoline has evaporated
      d. Get help when moving the trowel
      e. Keep feet away from blades and moving parts

Develop a Safety Attitude

TM 1

TM 2

Keep Hand Tools in Place



TM 3

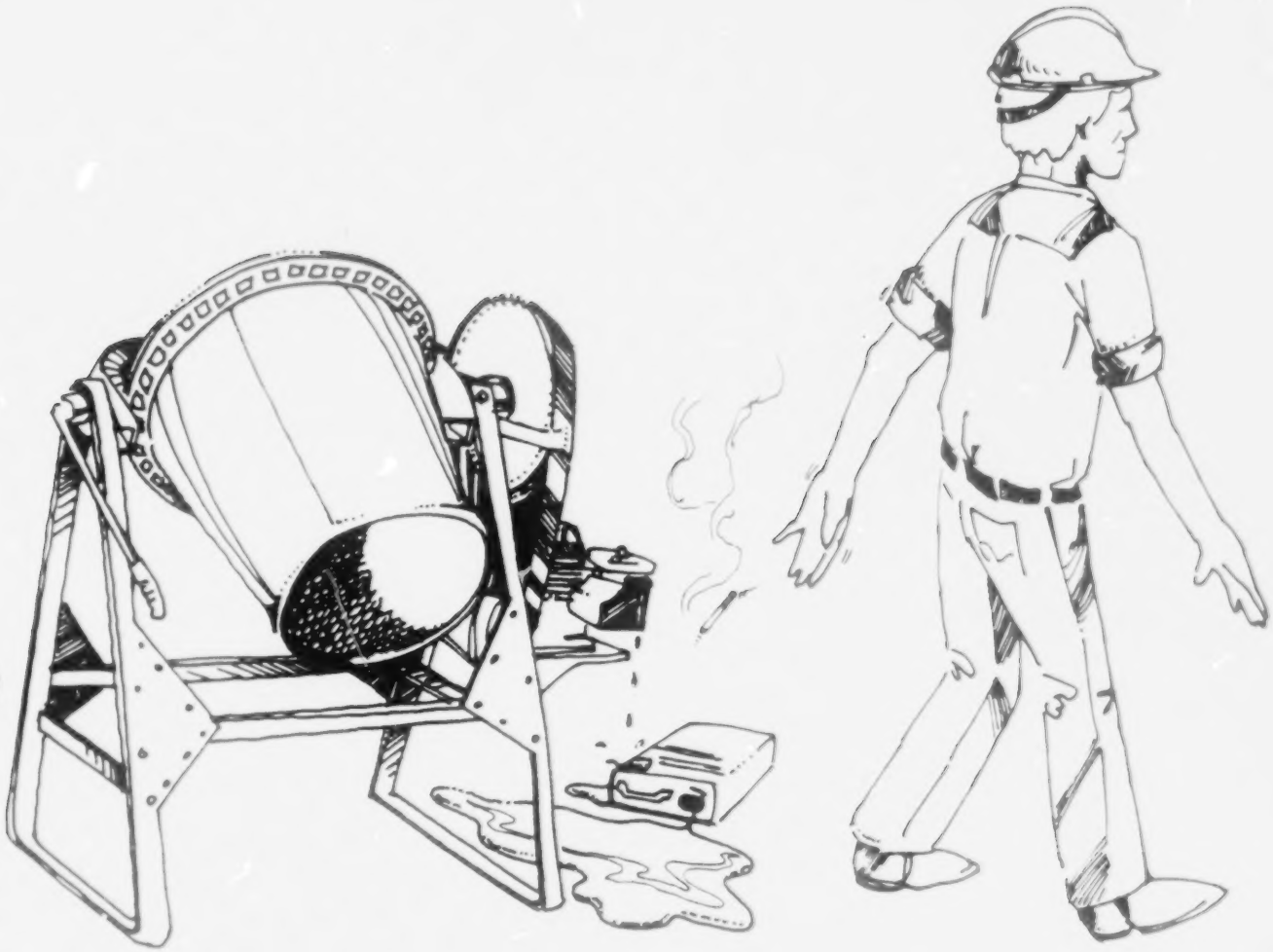
Be Sure Scaffolds are Secure

TM 4

Keep Your Hands Away from Turning Mixer

TM 5

Clean Up Spilled Gasoline



Keep a Firm Grip

DEVELOP A SAFETY IDEA

Directions: On a piece of poster board or typing paper, prepare a poster about masonry safety. You may want to use some of the safety rules covered in the information sheets for ideas in making your poster.

(Note: Your instructor may want to display your poster as a safety reminder.)

IDENTIFY HAND TOOL DANGERS

Directions: Write the possible hazards that exist in each situation below. Describe what could happen.

1. Hammers with large chips knocked off the face are being used

2. A person is cutting brick without safety glasses

3. Cords going to a mixer are frayed

4. A trowel is nicked and has sharp burrs

5. Gasoline is spilled on a hot engine

6. A gas can is left sitting by the motor on the mixer

ANSWERS TO ASSIGNMENT SHEETS 1 - 2

AS 1

Completed to the instructor's satisfaction

AS 2

Completed to the instructor's satisfaction

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 1: MASONRY SAFETY PRACTICES

LESSON TEST

Part 1. Match terms associated with masonry occupations to the correct definition by writing the letter of each term in the correct blank.

A.	Cement	AB.	Masonry
B.	Precast	AC.	Mortar mix
C.	Muriatic	AD.	Concrete
D.	Terrazzo	AE.	Caustic
E.	Lime	BC.	Plaster

I. Terms and definitions

____ 1. Any material that can cause burns by chemical reaction, such as an acid

____ 2. A powder made of lime, gypsum, iron ore, alumina, and silica; used in making concrete

____ 3. A mixture of cement, sand, and gravel that will harden when mixed properly with water

____ 4. A caustic material used in making mortar mix

____ 5. A term that refers to anything made of stone, concrete, brick, or tile materials

____ 6. A material containing lime that is used to bond brick or stone

____ 7. An acid combined with water that is used to remove dried mortar from masonry walls

____ 8. A concrete product that is poured at a plant in a form or mold and then delivered to the construction site

____ 9. A much-made cement, clays and other materials used to produce durable exterior or interior wall finishes

____ 10. A masonry product made of different sizes and shapes of flat marble stones that are set unevenly in concrete

Part 2. Point out the nature of work involved in masonry occupations by writing an "X" on the blank beside true statements.

____ 11. Involves working on jobs with one person only

____ 12. Requires no skills

____ 13. Provides a broad range of occupations

____ 14. Demands the use of many types of tools and equipment

____ 15. Masonry workers are held to 30 hours of work per week

____ 16. Salaries are set at minimum wage by the union

____ 17. Provides limited benefits

Part 3. Identify the types of jobs associated with masonry occupations by writing the letter of each listed below in the correct blank.

A.	Cement finisher	D.	Ready-mix plant worker
B.	Brick mason	E.	Plasterer
C.	Precast product plant worker	AB.	Building maintenance mason

____ 18. Pours concrete into forms and produces the required finish

____ 19. Constructs walls or structures of brick or other masonry material

____ 20. Applies cement plaster to surfaces as a finished surface or as a base for other masonry materials

____ 21. Operates heavy equipment and machinery to prepare cement, sand, and gravel in making concrete

____ 22. Sets up molds and forms to pour products such as beams, road pipe, stepping stones and other concrete products

____ 23. Mixes and applies mortar to cracks in masonry walls and concrete surfaces

Part 4. Select the correct safety rules by placing the letter of the correct words in the blank.

____ 24. A trowel should be used carefully because of:
A. sharp edges
B. germs
C. weight

____ 25. Brick hammers are made of hardened steel and can:
A. be too heavy to lift
B. shatter if struck against other hardened surfaces
C. cause strained muscles if used for long periods of time

____ 26. Mortar stands should be placed:
A. within easy reach
B. at a safe distance from the house
C. shoulder level

____ 27. Scaffolds should be built with:
A. light boards so they can be easily moved
B. scrap lumber to prevent waste
C. materials strong enough to support the worker, mortar and bricks

____ 28. Wheelbarrows should be used to:
A. push your friends around
B. lift light loads
C. move heavy loads

____ 29. The correct personal safety equipment that should be worn in masonry occupations includes:
A. rain coats and rubber boots
B. hard hats, steel-toed shoes, safety glasses
C. casual slacks with shined shoes

____ 30. Gasoline engine tanks should always be:
A. filled while in an open area
B. cleaned occasionally with gasoline
C. started with the gas cap off

____ 31. One should avoid _____ power equipment:
A. the use of
B. touching moving parts on
C. checking the oil on

MODULE: MASONRY PROCEDURES

ANSWERS TO UNIT I, LESSON 1 TEST

Part 1.

1.	AE	6.	AC
2.	A	7.	C
3.	AD	8.	B
4.	E	9.	BC
5.	AB	10.	D

Part 2.

11.	
12.	
13.	X
14.	X
15.	
16.	X
17.	X

Part 3.

18.	A	21.	D
19.	B	22.	C
20.	E	23.	AB

Part 4.

24.	A
25.	B
26.	A
27.	C
28.	C
29.	B
30.	A
31.	B

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 2: SET FORMS

LESSON OBJECTIVE

After completion of this lesson, the student will be able to CONSTRUCT FORMS FOR CONCRETE FLOORS AND WALKS, AND A FLAGSTONE. Mastery will be evidenced by completion of job sheets and by scoring _____ percent on lesson test.

SPECIFIC OBJECTIVES

In completing this lesson, the student will:

1. Define terms pertaining to forms for concrete floors and walks.

2. Describe the procedures needed to prepare the grade and install forms needed prior to pouring concrete for flat work.

2. Build forms for concrete floors and walks.

3. Construct a form for a flagstone.

Completion of the requirements of this lesson fulfills competency H-2 of Building Maintenance.

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 2: SET FORMS

CONTENTS OF LESSON

A. Objectives

B. Information outline

C. Transparency masters
   1. Slab-on-grade detail
   2. Stair construction
   3. Sidewalk forms
   4. Film underlayment and wire mesh
   5. Stakes and spreaders
   6. Tying rebar

D. Job sheets
   1. Building forms for concrete floors and walks
   2. Construct a form for flagstone

E. Lesson test

F. Answers to lesson test

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 2: SET FORMS

INFORMATION OUTLINE

I. Terms and definitions

A. Cement--a bonding material that hardens when mixed with water

B. Concrete--a mixture of cement, sand, gravel and water, combined in varying amounts according to intended use

C. Fill sand--the material used under concrete slabs to bring the ground level to the height desired

D. Tie wire--wire that is used to tie rebar together

E. Rebar--reinforcing steel rod used in concrete to add strength

F. Duplex nails--double headed nails used to hold concrete forms together

G. Remesh--reinforcement mesh made of crisscrossed wire

II. Areas where concrete flat work is used

A. Floors
1. Basement floors
2. Garage floors
3. Patios
4. House floors
5. Workshop floors

B. Stairways

C. Sidewalks

D. Driveways

E. Overhead flat work

III. Slab-on-grade (TM 1)

A. Grade must be level with enough material removed to accommodate concrete and any other material used under concrete

B. All service utilities must be installed prior to placement of concrete

C. Crushed stone placed under concrete to prepare base

D. Vapor or moisture barrier

E. Wire mesh for reinforcement

IV. Forming (TM 2, TM 3)

A. Sidewalks, driveways and other outside flatwork
   1. 4 to 6 inches thick. sloped approximately 1/4 inch per foot for drainage
   2. Formed with 2" x 4" material and staked to retain shape
   3. Top of form boards serve as screed to strike off concrete

V. Site preparation (TM 4, TM 5, TM 6)

A. Forms
   1. Use lumber strips (usually 1" by 12" lumber) held in place by stakes
   2. Clear the ground surface within the strips and level before pouring the concrete
   3. Construct forms that are strong enough to hold concrete in place until it hardens or "sets up"
   4. Make the surface level of the slab of concrete even with the top of the forms
   5. Assemble forms by using duplex nails for easy disassembly
   6. Construct forms tightly enough so they will not leak when wet concrete is poured into them

B. Form stakes
   1. Use 1" x 4" or 2" x 4" lumber
   2. Drive into ground next to forms to hold them in place

C. Fill sand
   1. Use to form a cushion for the concrete slab
   2. Will reduce the amount of concrete needed to fill form
   3. Serves as a bottom for slab form

D. Reinforcement steel, usually called rebar
   1. Consists of steel rod ranging from 1/4" to 1 1/2" in diameter placed inside of slabs as reinforcement
   2. Must be bent around the corners
   3. Should be overlapped at least 1" at the joints

4. Raise above the fill sand by placing bricks, rocks, or wire raisers under it

E. Reinforcement mesh, sometimes called remesh
   1. Consists of crisscrossed wire (usually 10-gauge) that forms 6" squares
   2. Must be measured to fit the area to be covered
   3. Is cut to size after measuring

      (Note: If lapping remesh is necessary to cover the area, overlap at least 6")

   4. Should be raised above fill sand with brick pieces, rocks or wire raisers
   5. If rebar is also used, remesh should be tied to rebar

      (CAUTION: Once steel or remesh is in place, footing becomes very hazardous--WATCH YOUR STEP)

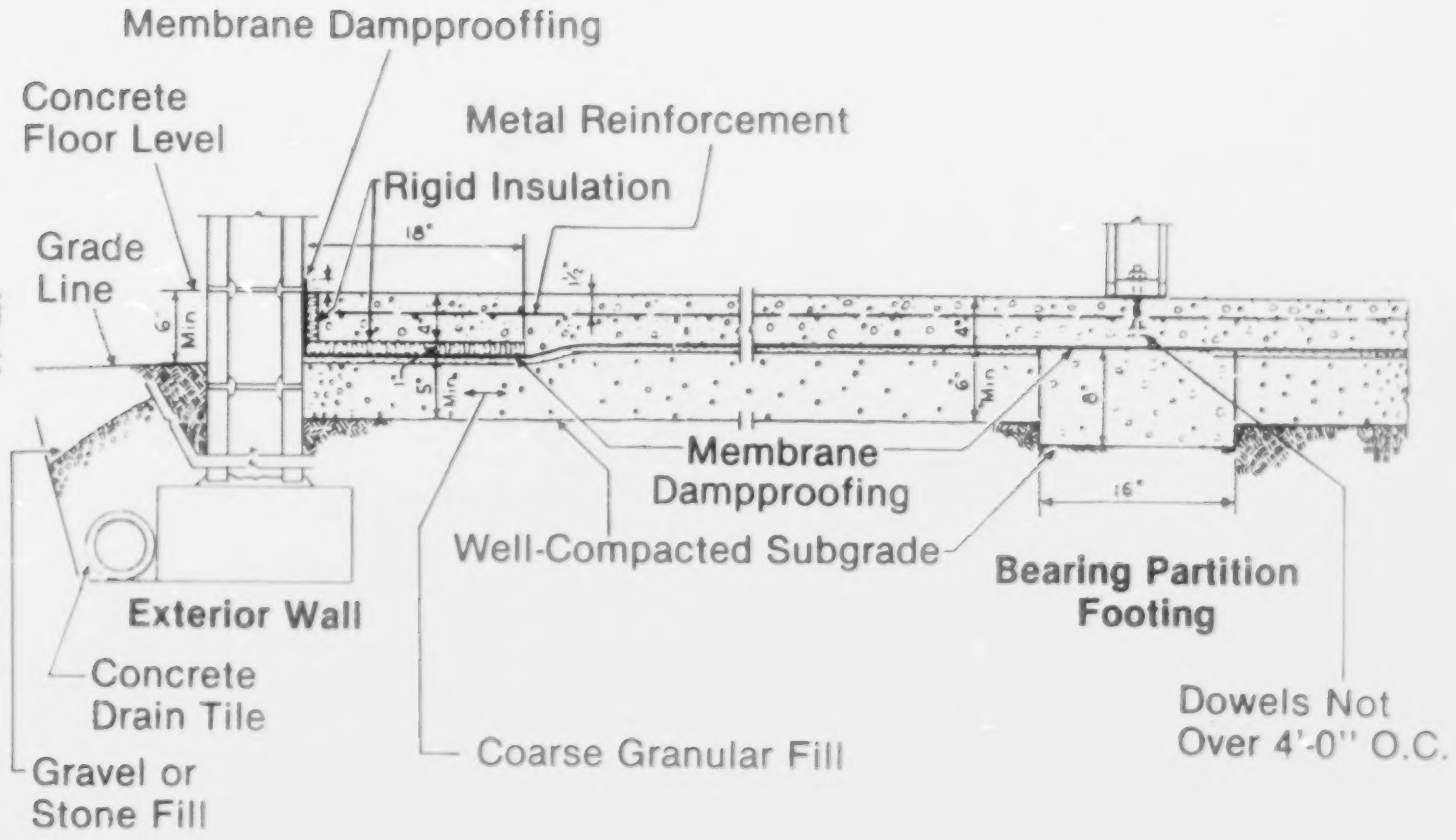
F. Grade stakes

   (Note: These may not be necessary on small jobs)

   1. Use lumber strips, usually 2" x 2" or 4" x 4"
   2. Place where they are needed to allow the finisher to determine the height or thickness to pour the slab
   3. Should be driven down slowly until stake is at the correct height

G. Spreaders
   1. Consist of pieces of lumber (could be 1" x 4") cut to length to hold forms apart
   2. When placed along the form boards to form a beam, these will hold the forms in place

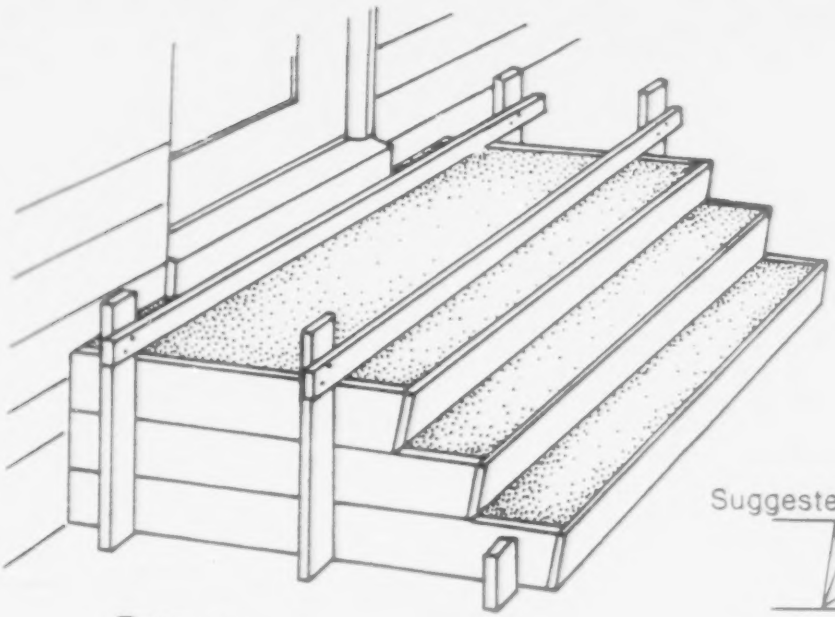
Slab-On Grade Detail



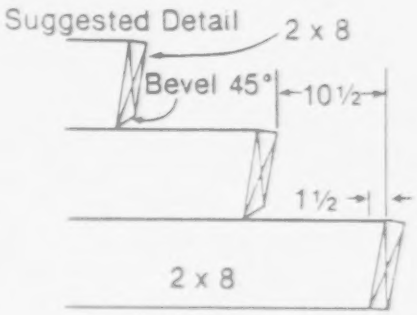
MP 41

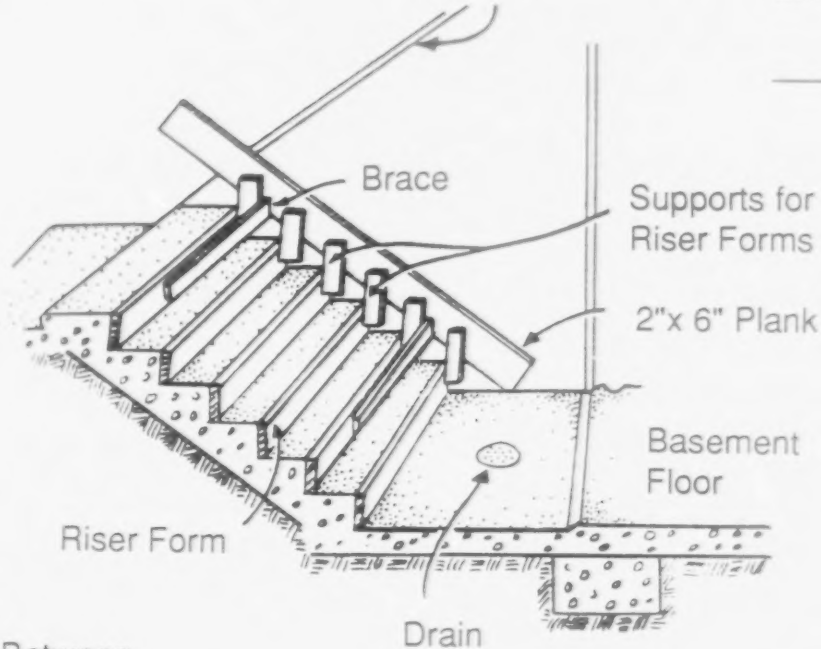
TM 1

Stair Construction



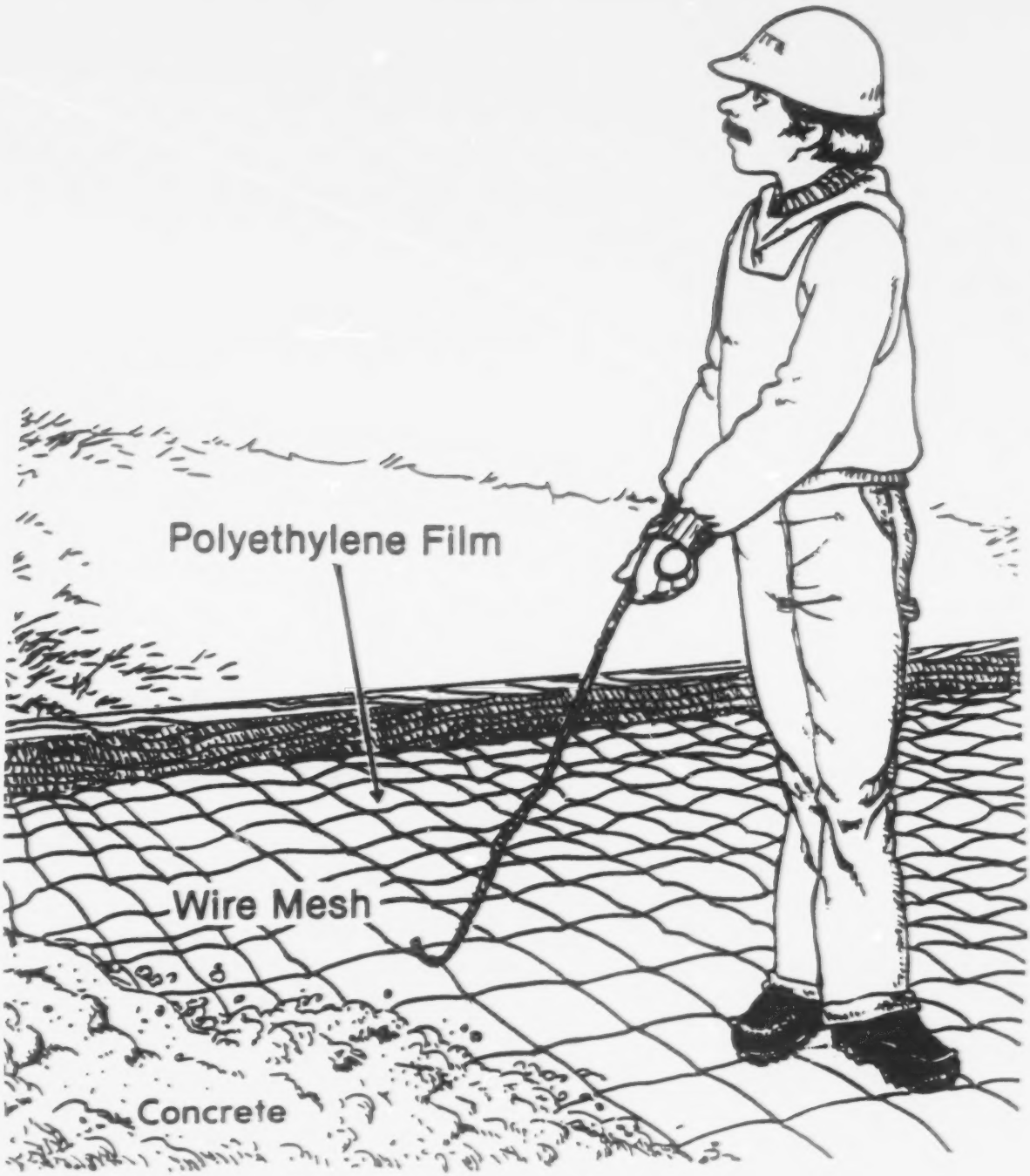
Entrance



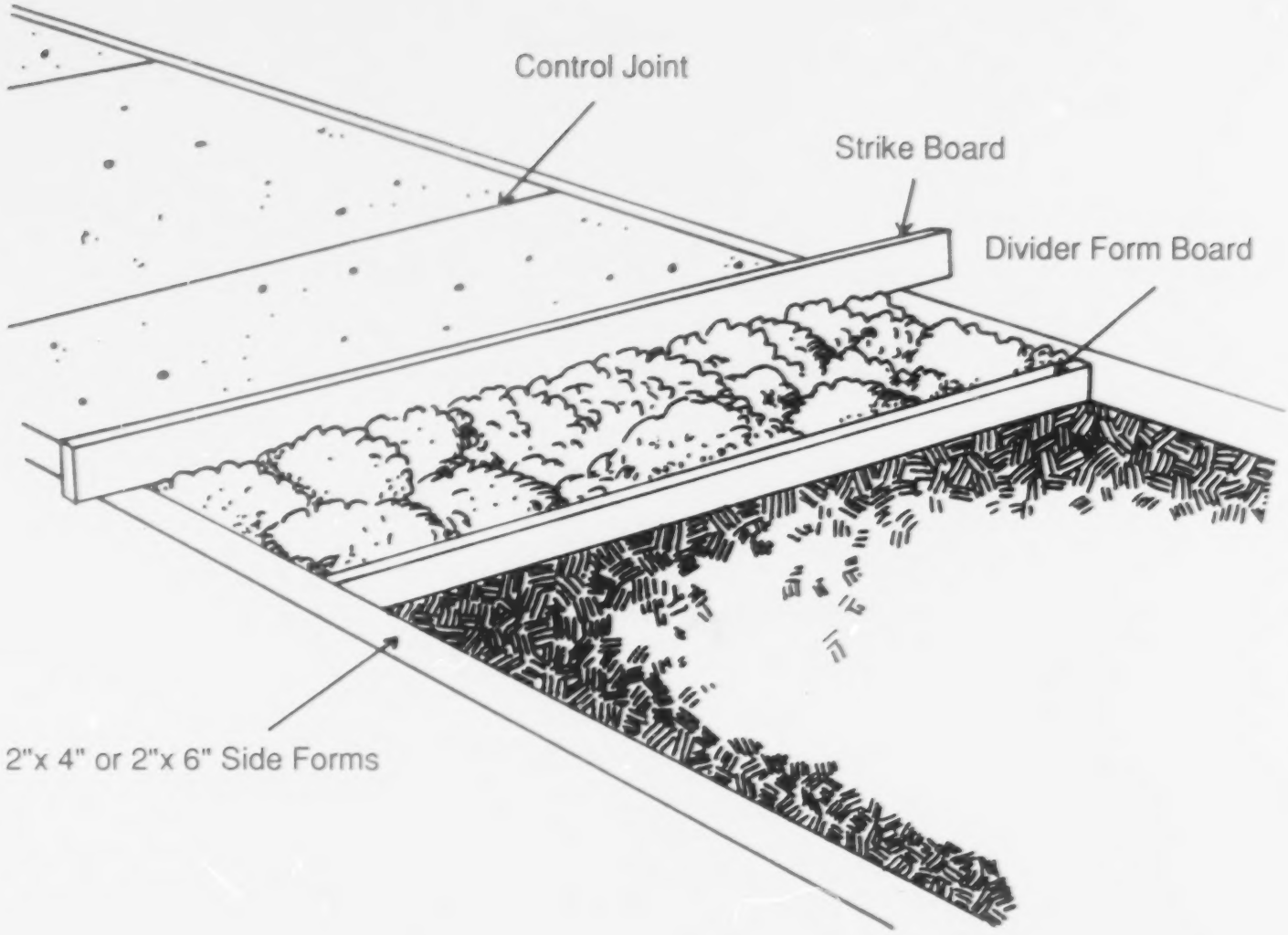


Between
Existing Walls

Film Underlayment and Wire Mesh TM 3



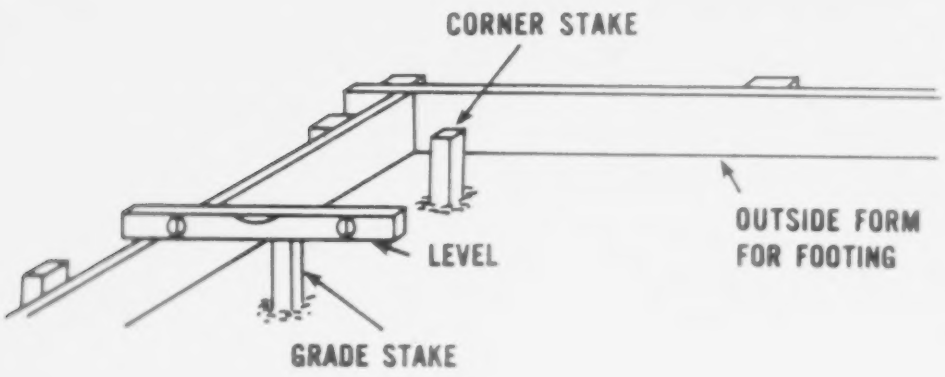
Sidewalk Forms

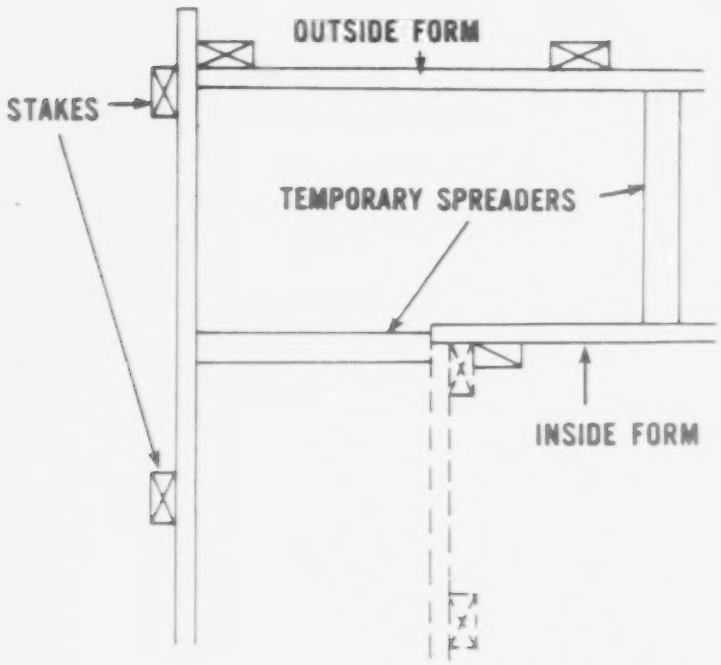


MP 47

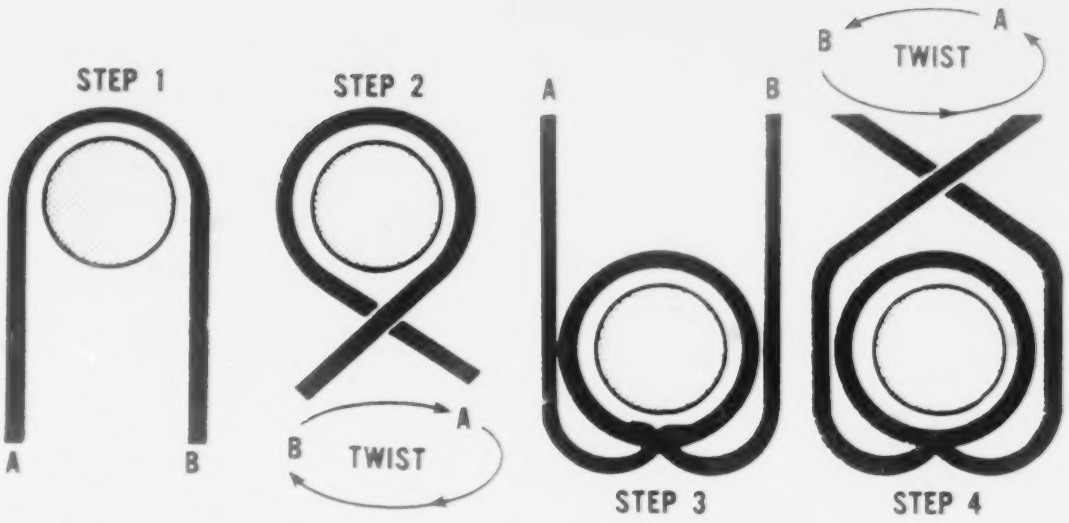
TM 4

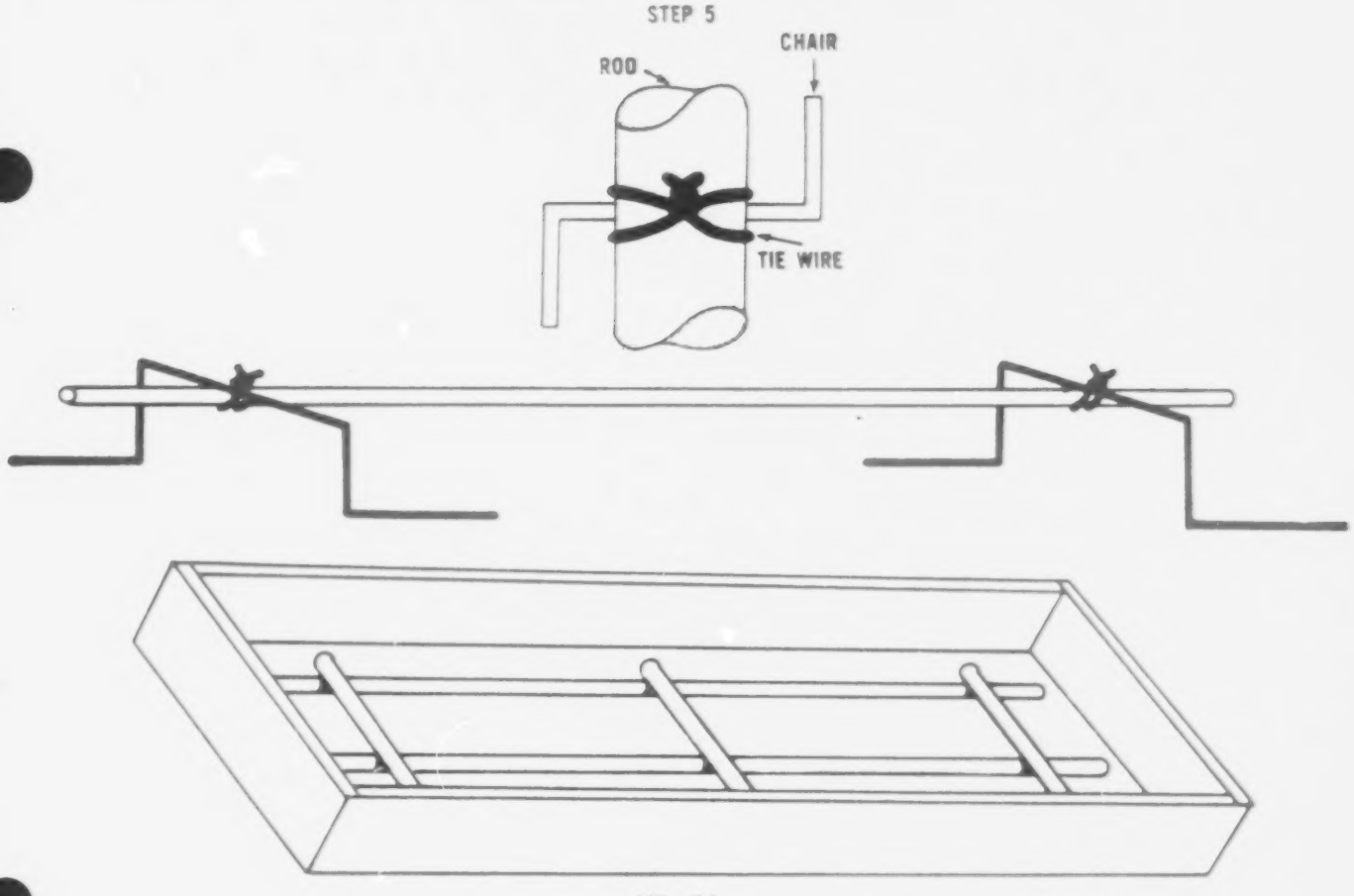
Stakes and Spreaders





Tying Rebar





MP 51

BUILDING FORMS FOR CONCRETE FLOORS AND WALKS

Equipment:

Hammer
Crosscut saw
Chalk line
Level
Steel tape
Steel square
Straight edge
Stakes--1 x 2 x 16 inches

Procedure:	Evaluation 3 2 1 N
1. Cut two 2" x 4" x 12', boards for side forms.	_ _ _ _
2. Cut two 2" x 4" x 4', and 3 1/4" boards for form ends.	_ _ _ _
3. Cut three 2" x 4" x 4', for spreaders.	_ _ _ _
4. Position side forms.	_ _ _ _
5. Drive a stake at the end of a side form.	_ _ _ _
6. Determine the elevation of this respective end.	_ _ _ _
7. Mark the elevation on the stake.	_ _ _ _
8. Fasten the side form so that the top aligns with the mark.	_ _ _ _
9. Pitch the side form according to drainage requirements and fasten.	_ _ _ _
10. Align the side form with a chalk line.	_ _ _ _
11. Drive stakes every three feet and nail to the outside of the form.	_ _ _ _
12. Position the three spreader pieces where the expansion joints are to be.	_ _ _ _
13. Secure the end members of the form.	_ _ _ _
(Note: Keep the top edges flush with those of the side forms.)	
14. Test the completed form with a straightedge.	_ _ _ _

15. Pack the fill dirt around the forms. _ _ _ _ _

16. Dampen the forms and ground prior to concrete placement. _ _ _ _ _

17. Have instructor check your work. _ _ _ _ _

18. As directed by instructor, prepare for next job sheet or clean up area and return tools and materials. _ _ _ _ _

Average of above evaluations*

*This average is the student's partial evaluation for competency G-2 of Building Maintenance.

CONSTRUCT A FORM FOR A FLAGSTONE

Equipment:

Hammer
Framing square
24-inch level
16 d duplex nails
Two pieces of lumber 2" x 4" x 16"
Two pieces of lumber 2" x 4" X 19 1/4"
15" x 15" piece of remesh
8 stakes

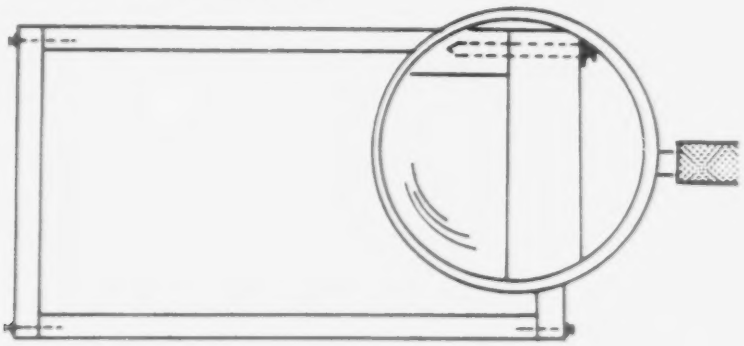
Procedure:

Evaluation
3 2 1 N

1. Level and clear ground where form will be placed. _ _ _ _

2. Nail 4 pieces of 2" x 4" together as shown below. _ _ _ _

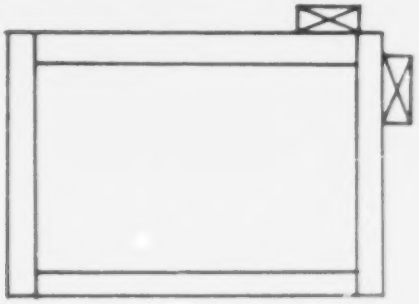
   (Note: Drive duplex nails in snugly to first head.)



3. Use two nails at each corner. _ _ _ _

4. Lay forms in position and check for squareness with a square. _ _ _ _

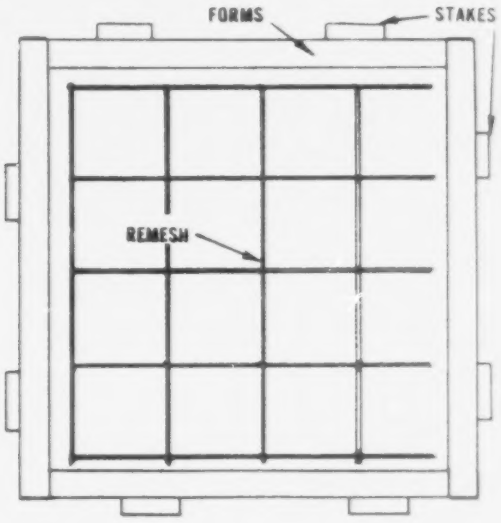
5. Drive 2 stakes in at one corner as shown below. _ _ _ _



6. Check outside corners for squareness. _ _ _ _

7. Drive in other 6 stakes. _ _ _ _

8. Place remesh in form as shown below. _ _ _ _



9. Have instructor check your work. _ _ _ _

10. As directed by instructor, prepare for next job sheet or clean up area and return tools and materials. _ _ _ _

Average of above evaluations* _ _ _ _

***This average is the student's partial evaluation for competency G-2 of Building Maintenance.**

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 2: SET FORMS

LESSON TEST

Part 1. Match the terms below with their correct definitions.

A.	Tie wire	D.	Cement
B.	Duplex nails	E.	Rebar
C.	Fill sand	AB.	Concrete
		AC.	Remesh

____ 1. A bonding material that hardens when mixed with water

____ 2. A mixture of cement, sand, gravel and water, combined in varying amounts according to intended use

____ 3. The material used under concrete slabs to bring the ground level to the height desired

____ 4. Wire that is used to tie rebar together

____ 5. Reinforcing steel rod used in concrete to add strength

____ 6. Double headed nails used to hold concrete forms together

____ 7. Reinforcement mesh made of crisscrossed wire

Part 2.

8. Describe the procedures needed to prepare the grade and install forms needed prior to pouring concrete for flat work.

MODULE: MASONRY PROCEDURES

ANSWERS TO UNIT I, LESSON 2 TEST

Part 1.

1.	D	3.	C	5.	E	7.	AC
2.	AB	4.	A	6.	B		

Part 2.

8. Answers should include:

A. Grade must be level with enough material removed to accommodate concrete and any other material used under concrete

B. All service utilities must be installed prior to placement of concrete

C. Crushed stone placed under concrete to prepare base

D. Vapor or moisture barrier

E. Wire mesh for reinforcement

F. Use lumber strips (usually 1" by 12" lumber) held in place by stakes

G. Clear the ground surface within the strips and level before pouring the concrete

H. Construct forms that are strong enough to hold concrete in place until it hardens or "sets up"

I. Make the surface level of the slab of concrete even with the top of the forms

J. Assemble forms by using duplex nails for easy disassembly

K. Construct forms tightly enough so they will not leak when wet concrete is poured into them

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 3: MIX CONCRETE

LESSON OBJECTIVE

After completion of this lesson, the student will KNOW THE COMPOSITION OF CONCRETE AND BE ABLE TO MIX CONCRETE. Mastery will be evidenced by completion of job sheet and by scoring _____ percent on the lesson test.

SPECIFIC OBJECTIVES

In completing this lesson, the student will:

1. Identify the composition of concrete.
2. Choose the desired properties of correctly blended concrete.
3. Define four types of concrete.
4. Identify the raw materials for cement.
5. Choose the advantages of ready-mixed concrete.
6. Define the three types of mixing for ready-mixed concrete.
7. List preparations for ready-mixed concrete.
8. Mix concrete.

Completion of the requirements of this lesson fulfills competency H-3 of Building Maintenance.

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 3: MIX CONCRETE

CONTENTS OF LESSON

A. Objectives

B. Information outline

C. Job sheet
   1. Mix concrete

D. Lesson test

E. Answers to lesson test

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 3: MIX CONCRETE

INFORMATION OUTLINE

I. Types of concrete

A. Ready-mixed concrete
1. Used mostly in building construction
2. Placed in forms or hopper

B. Cinder concrete
1. Cinders replace stone as aggregate
2. Used for fireproofing and for short reinforced floor
3. Advantage--lightness in weight

C. Reinforced concrete
1. Concrete with steel bars or mesh embedded
2. Material and labor cost higher

D. Prestressed concrete
1. Concrete whose stresses resulting from external loadings are counterbalanced by prestressing reinforcement placed in the structure
2. Examples
a. Double and single tees
b. Channel sections
c. Beams
d. Hollow slabs
e. Flat planks

II. Weight of concrete

A. 105 to 160 pounds per cubic foot

B. Most common is 145 pounds per cubic foot

C. Cinder concrete weighs 75 to 115 pounds per cubic foot

III. Proportions for concrete mix

A. Generally 1:2:4:8:
1. 1 part cement
2. 2 parts sand
3. 4 parts stone
4. 8 parts water

B. Common practice--use half as much sand as the volume of broken stone

C. Objectives of properly designed concrete mix
   1. Required qualities of hardened concrete
   2. Workability of fresh concrete
   3. Economy

D. Quality determiners
   1. Water-cement ration
   2. Entrained air
   3. Curing

IV. Portland cement--a type of cement, not a brand name

A. Raw materials
   1. Lime
   2. Silica
   3. Alumina
   4. Iron

B. Types
   1. Type I--normal portland (general purpose cement)
   2. Type II--modified portland cement--generates heat at a slower rate
   3. Type III--high early strength portland cement--used where high strengths are need at early periods
   4. Type IV--low heat portland cement--used where amount and rate of heat generated must be at a minimum, such as for large gravity dams
   5. Type V--sulfate resistant portland cement--used only in construction exposed to severe sulfate action

V. Ready-mixed concrete

A. Production
   1. Mix plants use precision scales

B. Types of mixing
   1. Transit-mixed--concrete mixed completely in a truck mixer
   2. Central-mixed--concrete mixed completely in a stationary mixer and delivered in a truck agitator, a truck mixer operating at agitating speed, or a special non-agitating truck
   3. Shrink-mixed--concrete mixed partially in a stationary mixer and the mixing completed in a truck mixer

C. Advantages
   1. Assures purchasers of accurately proportioned mix
   2. Efficient operation at the job site
   3. Eliminates time in estimating
   4. No storage problem
   5. No clean-up problem
   6. Eliminates need for concrete-mixing specialists
   7. Specific delivery time is possible
   8. Economical because of large volume

D. Specifications for ready-mixed concrete
   1. Cement content in bags per cubic yard of concrete
   2. Size of coarse aggregate
   3. Maximum allowable water content in gallons per bag of cement
   4. Slump(s) desired at the point of delivery
   5. When air-entraining concrete is specified, the maximum and minimum limits for air content of samples taken from the transportation unit at the point of discharge

E. Advanced preparation for using ready-mixed concrete
   1. Forms well braced
   2. Sub-grade dampened
   3. Wheelbarrows handy
   4. Strike-off boards ready
   5. Planks and runways in place
   6. Vibration equipment ready
   7. Straightedge ready
   8. Curing materials ready

MIXING CONCRETE

Equipment:

Mixer (automated drum)
Sand shovel
Water hose (cleaning)
Concrete mix
Sand and aggregates
Water

Procedure:

Evaluation
3 2 1 N

1. Make preliminary preparations and inspection. _ _ _ _
   A. Weather conditions
   B. Expected consistency of slump
   C. Required compressive strength
   D. Sand and aggregate proportions
   E. Water and concrete mix proportions

   (Note: Allow for the water content in moist sand.)

2. Choose the mixing site for convenience in placing. _ _ _ _

3. Record the final desired proportions for the mix, aggregates, and water. Adhere to these figures during the operation in order to obtain consistent and compatible mixtures. _ _ _ _

4. Mix all dry materials (concrete mix and aggregates) thoroughly. Do this outside the drum. _ _ _ _

5. Pour about 10 percent of the mixing water into the drum. _ _ _ _

6. Start the drum rotating. _ _ _ _

7. Uniformly add the dry mix and water until all the materials are being mixed at once. _ _ _ _

   (Note: 10 percent of the water is withheld for a short period to allow for more adequate mixing.)

8. Allow the materials to mix for at least one minute--three is better. _ _ _ _

9. Remove the mixture from the drum. It is now ready for use. ____

10. Have instructor check your work. ____

11. As directed by instructor, prepare for next job sheet or clean up area and return tools and materials. ____

(Note: After each job, clean the mixer interior. It may be necessary to use muriatic acid to remove concrete build-up. Never use a heavy hammer.)

Average of above evaluations* ____

*This average is the student's partial evaluation for competency H-3 of Building Maintenance.

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 3: MIX CONCRETE

LESSON TEST

Part 1. Place an "X" in the blank beside each component of concrete.

____ 1. Water

____ 2. Cement

____ 3. Steel

____ 4. Dirt

____ 5. Sand

____ 6. Aggregate (rock)

Part 2. Place an "X" in the blank beside each desireable quality of a concrete mix.

____ 7. Required qualities of hardened concrete

____ 8. A slick, shiny finish

____ 9. Workability of fresh concrete

____ 10. Economy

Part 3. Match the four types of concrete with the correct definitions.

A. Cinder concrete
B. Ready-mixed concrete
C. Prestressed concrete
D. Reinforced concrete

____ 11. Used mostly in building construction

____ 12. Light weight; used for fireproofing and for short reinforced floor

____ 13. Concrete with steel bars or mesh embedded

____ 14. Concrete whose stresses resulting from external loadings are counterbalanced by prestressing reinforcement placed in the structure

Part 4. Place an "X" in the blank beside each item that is an ingredient in cement.

____ 15. Sand

____ 16. Lime

____ 17. Water

____ 18. Silica

____ 19. Alumina

____ 20. Gravel

____ 21. Iron

Part 5. Match the three types of mixing for ready-mixed concrete with the correct definitions.

A. Central mixed
B. Shrink-mixed
C. Transit-mixed

____ 22. Concrete mixed completely in a truck mixer

____ 23. Concrete mixed completely in a stationary mixer and delivered in a truck agitator, a truck mixer operating at agitating speed, or a special non-agitating truck

____ 24. Concrete mixed partially in a stationary mixer and the mixing completed in a truck mixer

Part 6. List five advantages of using ready-mixed concrete

25.

26.

27.

28.

29.

Part 7. List five things that must be done in preparation for ready-mixed concrete.

30.

31.

32.

33.

34.

Part 8. What is the meaning of the concrete formula 1:2:4:8:

35.

MODULE: MASONRY PROCEDURES

ANSWERS TO UNIT I, LESSON 3 TEST

Part 1.

1.	X	3.		5.	X	6.	X
2.	X	4.					

Part 2.

7.	X	8.		9.	X	10.	X

Part 3.

11.	B	12.	A	13.	D	14.	C

Part 4.

15.		17.		19.	X	21.	X
16.	X	18.	X	20.			

Part 5.

22.	C	23.	A	24.	B

Part 6.

25.- 29. Answers should include:
1. Assures purchasers of accurately proportioned mix
2. Efficient operation at the job site
3. Eliminates time in estimating
4. No storage problem
5. No clean-up problem
6. Eliminates need for concrete-mixing specialists
7. Specific delivery time is possible
8. Economical because of large volume

Part 7.

30.- 34. Answers should include:
1. Forms well braced
2. Sub-grade dampened
3. Wheelbarrows handy
4. Strike-off boards ready
5. Planks and runways in place
6. Vibration equipment ready
7. Straightedge ready
8. Curing materials ready

Part 8.

35. 1 part cement
2 parts sand
4 parts stone
8 parts water

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 4: PATCH AND/OR REPAIR CONCRETE

LESSON OBJECTIVE

After completion of this lesson, the student will be able to PATCH OR REPAIR CONCRETE SURFACES. Mastery will be evidenced by completion of job sheets.

SPECIFIC OBJECTIVES

In completing this lesson, the student will:

1. Repair a small crack in concrete.
2. Resurface a concrete slab.

Completion of the requirements of this lesson fulfills competency H-4 of Building maintenance.

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 4: PATCH AND/OR REPAIR CONCRETE

CONTENTS OF LESSON

A. Objectives

B. Information outline

C. Job sheets
   1. Repair small crack in concrete
   2. Resurface a concrete slab

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 4: PATCH AND/OR REPAIR CONCRETE

INFORMATION OUTLINE

I. Materials

A. Cement--portland

B. Sand--fine

C. Gravel--small pea-sized

D. Glue or adhesive

II. Surfaces

A. Walls

B. Flat

C. Corners

D. Steps

III. Importance

A. If made early can eliminate a major masonry job

REPAIR SMALL CRACK IN CONCRETE

Equipment:

Portland cement	Sand
Concrete glue	Water
Brush	Flat trowel
Sponge	Bucket
Cold Chisel	Hammer

Procedures:	Evaluation 3	2	1	N
1. Use a cold chisel and dig out loose concrete and V-groove crack or undercut the edge.	_	_	_	_
2. Clean out concrete crack with brush or water to prepare for repair material.	_	_	_	_
3. Dampen the repair area with a wet brush or sponge.	_	_	_	_
4. Brush on concrete glue or cement adhesive to repair area.	_	_	_	_
5. Mix repair patch from premix repair material or use 1 part portland cement, 2 parts sand with water.	_	_	_	_
6. With a trowel, apply repair material to repair area--level with surrounding area.	_	_	_	_
7. Protect repair area to hold moisture and to prevent damage until cement is cured.	_	_	_	_
8. Dampen repair area to cure for 48 hours or as needed.	_	_	_	_
9. Have instructor check your work.	_	_	_	_
10. As directed by instructor, prepare for next job sheet or clean up area and return tools and materials.	_	_	_	_
Average of above evaluations*	_	_	_	_

***This average is the student's partial evaluation for competency H-4 of Building Maintenance.**

RESURFACE A CONCRETE SLAB

Equipment:

Concrete glue	Brush
Portland Cement	Sand
Pea gravel	Straightedge
Concrete finishing tools	

Procedures:	Evaluation 3 2 1 N
1. Form up area to be resurfaced to desired grade.	_ _ _ _
2. Clean off area to be covered of all stains, paint, etc.	_ _ _ _
3. Paint area with concrete glue.	_ _ _ _
4. Apply mix of 1 part portland cement, 2 parts sand and 2 parts pea gravel with water and glue in mix (not more than 5 gallons of water per bag of cement).	_ _ _ _
5. Level concrete with straightedge to desired grade.	_ _ _ _
6. Finish concrete to desired texture (match surrounding area).	_ _ _ _
7. Keep repair area damp for at least 6 days or more to cure.	_ _ _ _
8. Have instructor check your work.	_ _ _ _
9. As directed by instructor, prepare for next job sheet or clean up area and return tools and materials.	_ _ _ _
Average of above evaluations*	_ _ _ _

*This average is the student's partial evaluation for competency H-4 of Building Maintenance.

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 5: POUR AND FINISH CONCRETE

LESSON OBJECTIVE

After completion of this lesson, the student will be able to POUR AND FINISH CONCRETE. Mastery will be evidenced by completion of assignment sheets, job sheets and by scoring _____ percent on the lesson test.

SPECIFIC OBJECTIVES

In completing this lesson, the student will:

1. Define terms related to concrete finishing.
2. Identify tools used in pouring and finishing concrete.
3. Pour and finish concrete.

Completion of the requirements of this lesson fulfills competency H-5 of Building Maintenance.

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 5: POUR AND FINISH CONCRETE

CONTENTS OF LESSON

A. Objectives

B. Information outline

C. Transparency masters
   1. Concrete working tools
   2. Concrete finishing tools
   3. Portable concrete mixer
   4. Power trowel

D. Assignment sheet
   1. Identify concrete tools

E. Answers to assignment sheet

F. Job sheets
   1. Building foundations and slabs
   2. Pour and finish a flagstone

G. Lesson test

H. Answers to lesson test

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 5: POUR AND FINISH CONCRETE

INFORMATION OUTLINE

I. Terms and definitions

A. Screed--a straight piece of material, such as a 2" x 4" board, that is used to level the surface of wet concrete

B. Knee boards--boards that are used by the concrete workers to kneel on while working wet concrete

C. Site--place where concrete will be poured

D. Pouring--placing mixed concrete into the forms

E. Vibrating--removing air bubbles from wet concrete

F. Screeding--leveling the surface of wet concrete immediately after pouring

G. Jitterbugging--pushing the gravel below the surface of wet concrete

H. Floating--bringing water and cement to the surface of a slab

I. Finishing--putting the final shape and surface on uncured concrete

J. Jointing--putting grooves in a slab to control cracking

K. Edging--rounding the edge of a slab to prevent chipping or damage

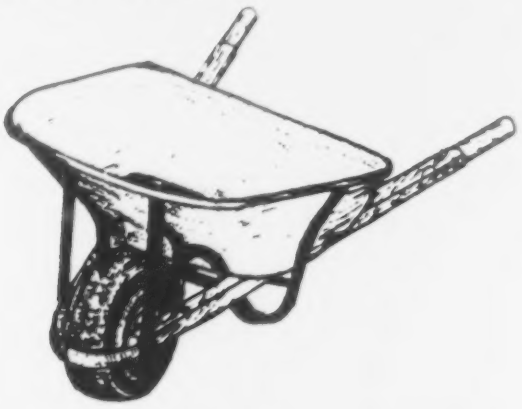
L. Troweling--smoothing the surface on concrete

M. Curing--a process within the concrete that makes it solid

N. Spreaders--wood or metal strips used to keep forms spread apart

II. Concrete pouring and finishing tools (TM 1, TM 2, TM 3, TM 4)

A. Contractor's wheelbarrow--a one-wheel cart used to move concrete or fill sand; usually holds from 3 1/2 to 5 1/2 cubic feet of material

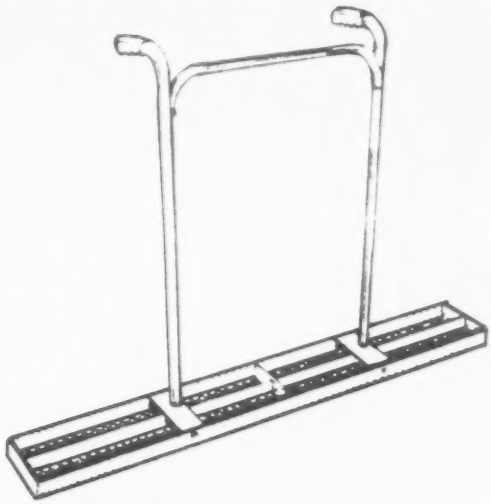


B. Shovel--a tool used to mix concrete

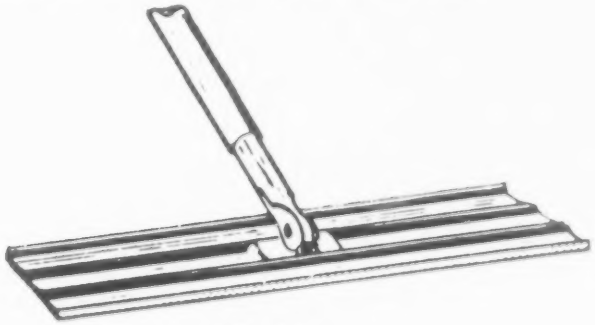
C. Knee pads--leather or heavy rubber pads used to protect the knees while finishing concrete

D. Concrete placer--a wide-bladed device with a handle; used to spread wet concrete

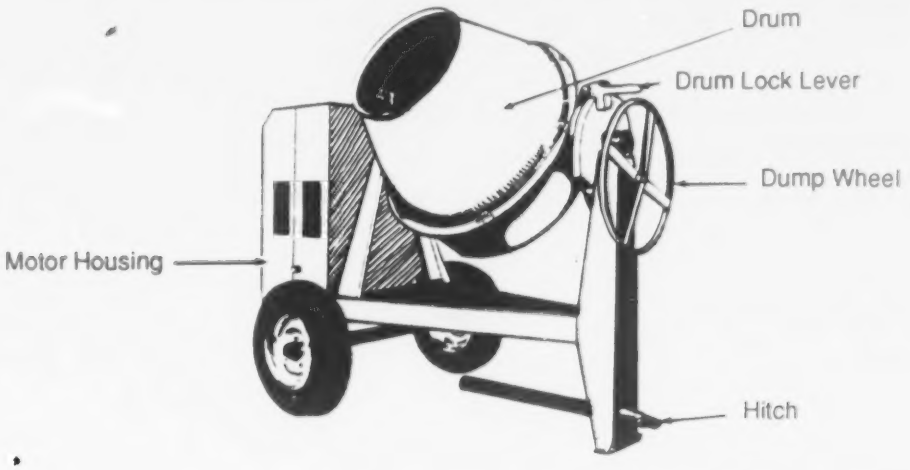
E. Jitterbug--a tool used to tamp the gravel below the surface of wet concrete to allow a smooth finish



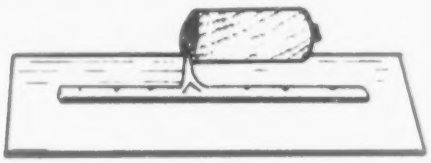
F. Bull float--a device used to make the water rise to the surface of wet concrete and to remove the water after the wet concrete has been "jitterbugged"



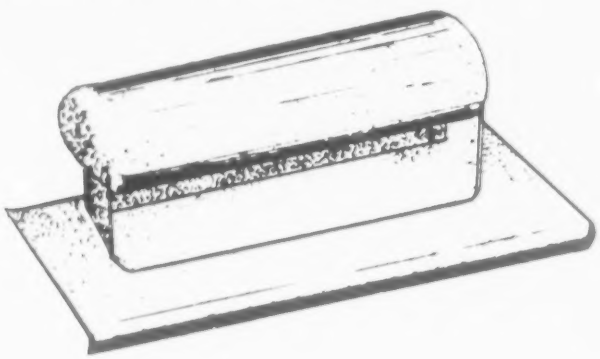
G. Concrete mixer--a container in which cement, sand, gravel, and water can be thoroughly mixed



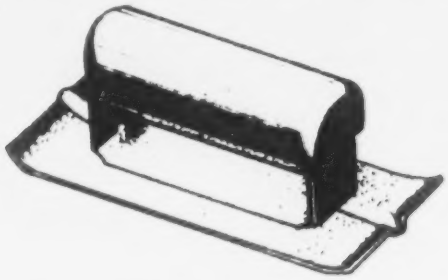
H. Hand trowel--a tool used for final finishing of concrete (comes in various sizes)



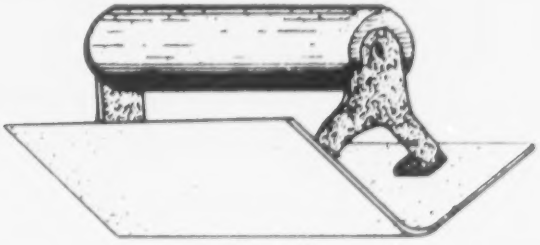
I. Cement edger--a small trowel with one curved edge for use on edges of slabs and sidewalks



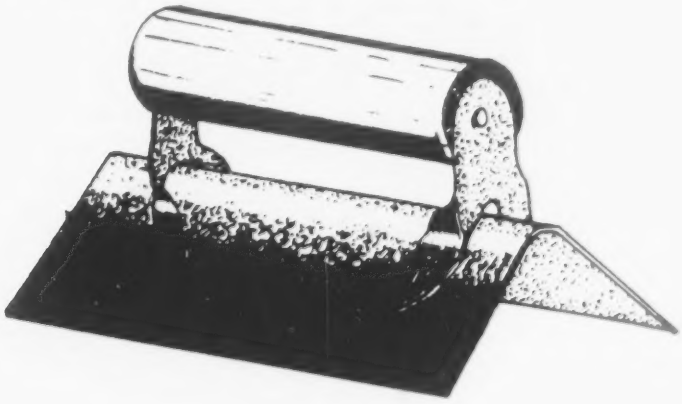
J. Cement groover--a tool used to form grooves in sidewalks and patios



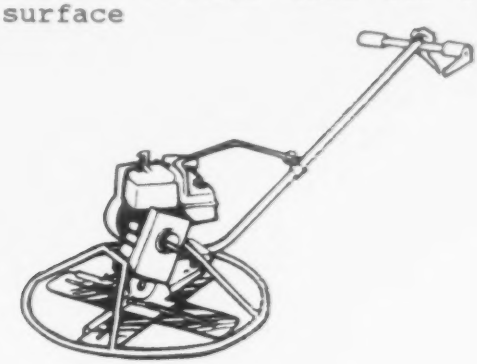
K. Inside corner trowel--a tool used to smooth inside corners (such as steps)



L. Outside corner trowel--a tool used to smooth outside corners (such as steps)



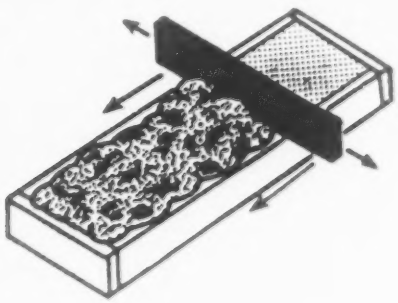
M. Power trowel--a machine used for rough troweling the concrete surface



III. Methods of finishing concrete

A. Vibrating
   1. Use commercial vibrator if possible
   2. Use hammer to strike forms if there is no vibrator
   3. Do not let vibrator touch forms
   4. Be sure to vibrate all the way to the bottom of the forms

B. Screeding
   1. Be sure screed is straight
   2. One person is on each end of screed and one is in the concrete with shovel or concrete placer
   3. Move screed from side to side about 6 inches while slowly moving forward over surface
   4. Keep screed on top of forms by pushing down while screeding
   5. Remove excess concrete with shovel or concrete placer



C. Jitterbugging

(CAUTION: Wear rubber boots while walking in concrete)

1. Use both hands on jitterbug
2. Push concrete into your tracks with your feet before jitterbugging that area
3. Always walk backward while jitterbugging
4. Do not strike or step on forms
5. Tamp firmly to push rocks or gravel below surface
6. Jitterbug in rows

D. Floating
1. If possible, do not walk on wet concrete while floating
2. Use knee boards if floating requires being on wet concrete
3. Float only until excess water is removed and paste forms on surface

E. Troweling
1. Troweling too soon or too late will cause a poor finish
2. Concrete must begin to set before troweling
3. The forward edge of the trowel should be held about 1/8 inch above the concrete
4. Amount of pressure to apply will vary depending on how much the concrete has set
5. Trowel in overlapping semi-circles as shown below
6. Edge the corners with cement edger
7. Retrowel surface and edges if necessary

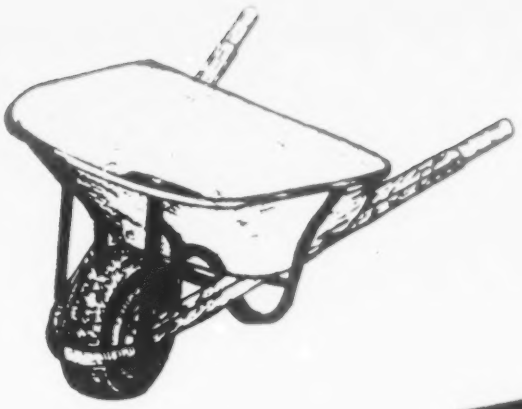
(Note: It may be necessary to trowel as many as three times to get desired finish)

IV. Pouring and curing considerations

A. Pouring concrete
1. Always fill beams first, beginning at farthest corner
2. Pouring too fast may move forms
3. Fill to top of forms

B. Curing concrete
1. Protect concrete from rapid drying
2. Keep the concrete above freezing until it has set
3. Concrete should be allowed to cure for at least two days before working on top of slab

Concrete Working Tools



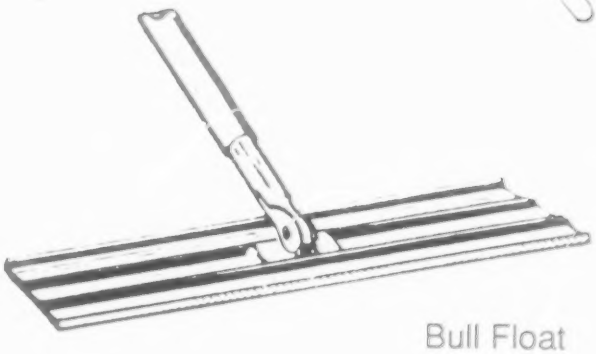
Wheelbarrow

Knee Pads Shovel

Concrete Placer

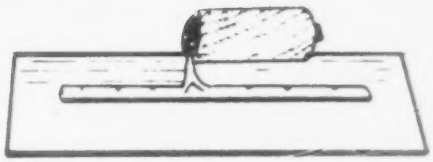
Shovel

Jitter Bug

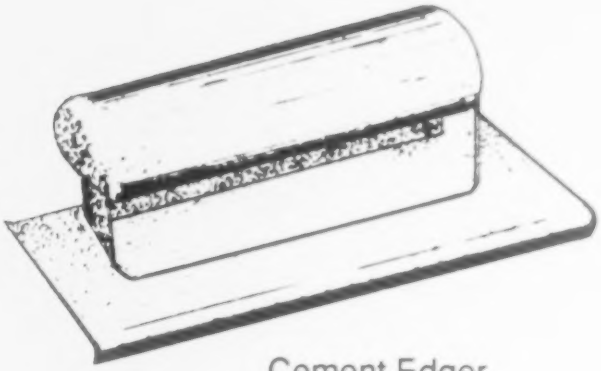


Bull Float

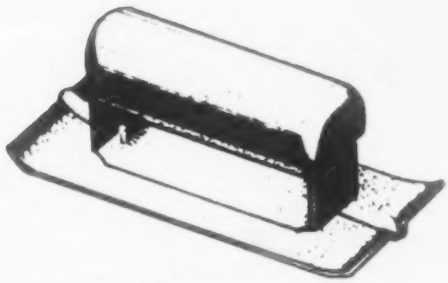
Concrete Finishing Tools



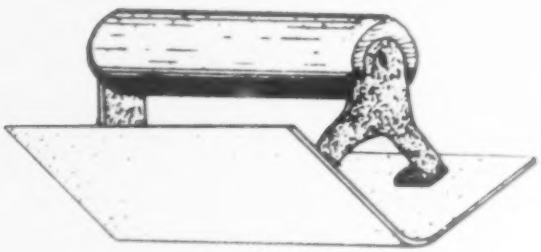
Trowel



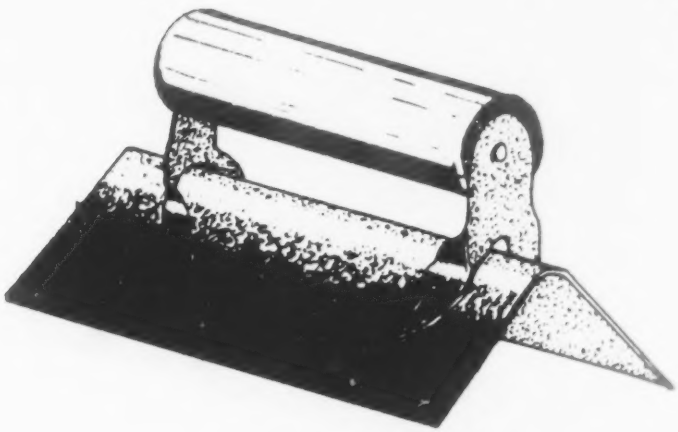
Cement Edger



Cement Groover

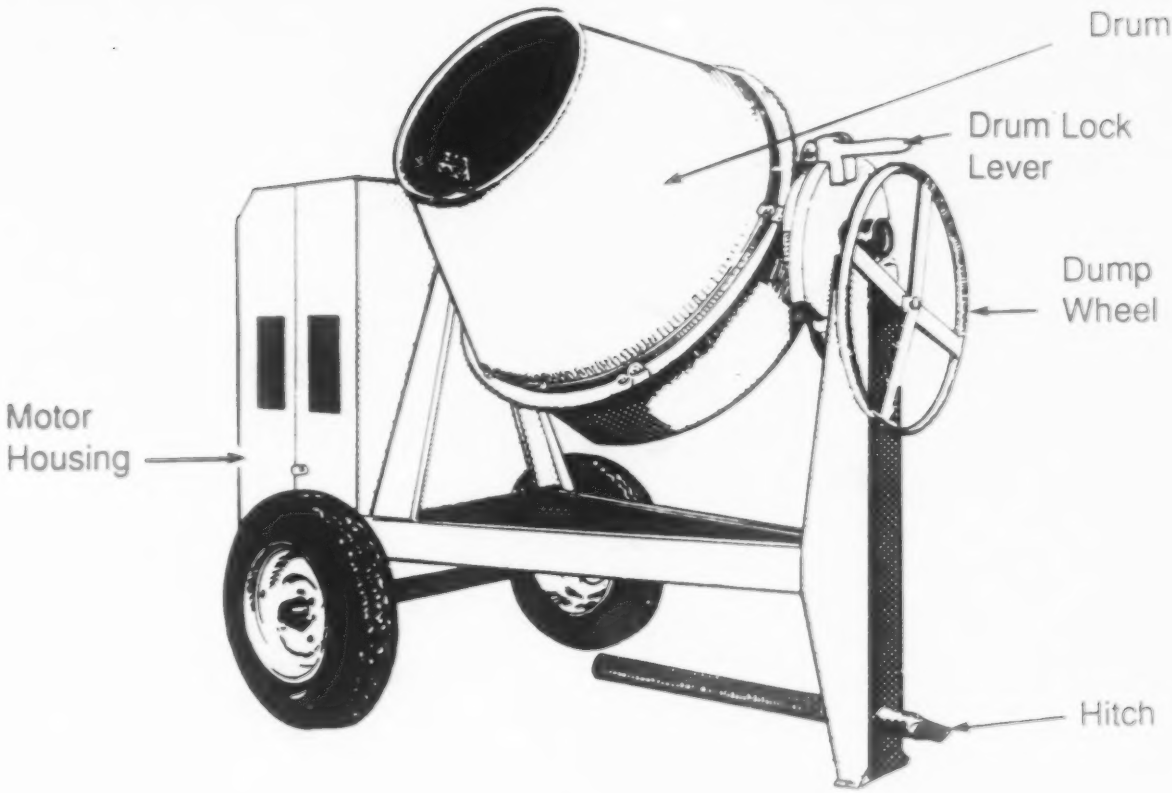


Inside Corner Trowel



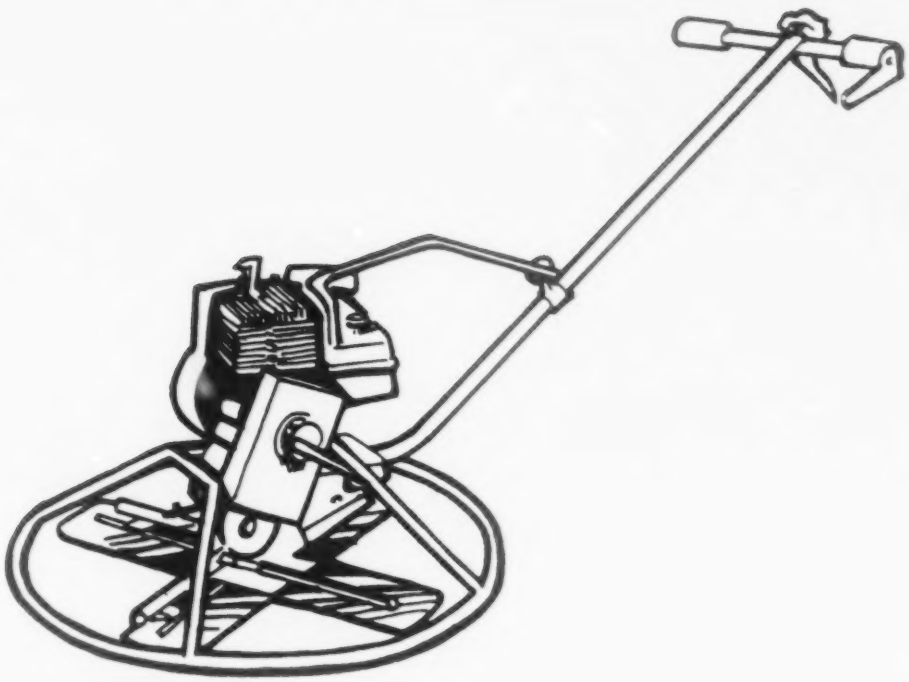
Outside Corner Trowel

Portable Concrete Mixer



TM 4

Power Trowel

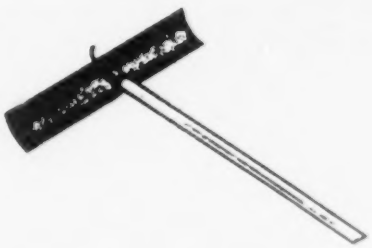


IDENTIFY CONCRETE TOOLS

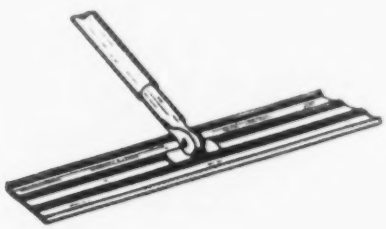
Directions: Identify the tools used for working concrete by writing the correct name from the list below in the blank provided. On the right side of the sheet, describe the use of the tool.

Concrete placer	Bull float
Jitterbug	Wheelbarrow
Cement edger	Cement groover
Trowel	

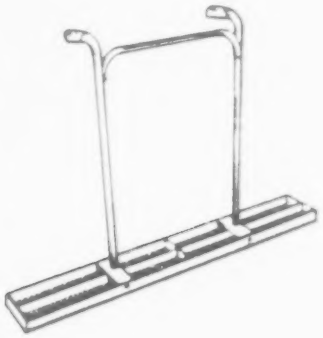
A. _____



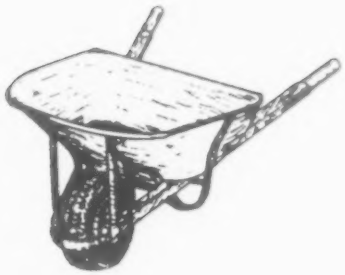
B. _____



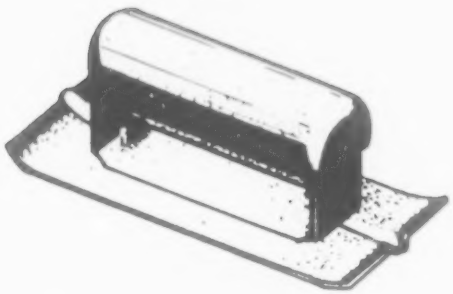
C. _____



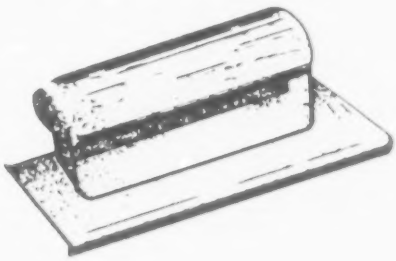
D. _____



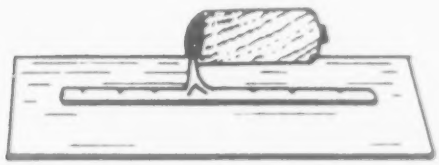
E. _____



F. _____



G. _____



This assignment sheet partially fulfills competency H-5 of Building Maintenance.

ANSWERS TO ASSIGNMENT SHEET

(Note: The description of the use of the tools should be evaluated to the satisfaction of instructor.)

A. Concrete placer

B. Bull float

C. Jitterbug

D. Wheelbarrow

E. Cement edger

F. Cement groover

G. Trowel

Equipment:

Straightedge
Edge trowels
Shovels and rakes
Bull float
Knee boards
Trowels
Hammer
Control joint tool
Ready-mix concrete
Wooden hand trowel

Procedure:

	Evaluation 3	2	1	N
1. Examine mixture for consistency.				
(Note: If mixture is thick, add only enough water to permit easy handling. To avoid unnecessary physical labor, provisions should be made to allow the concrete truck close access to the forms.)				
2. Pour needed amount in area, distributing it uniformly over the area to desired depth.				
(Note: Begin strike-off procedure as soon as possible with straightedge drawn across top of forms or screed boards.)				
3. Continue strike-off until forms are completely filled but not over full.				
4. Work material down at all areas along forms to prevent honeycombing.				
(Note: Honeycombing is a condition where concrete binding is not distributed uniformly through the mix, allowing pockets of air or aggregate.)				
5. Bull float the entire surface until surface is completely level (high spots removed, low spots filled).				
6. Allow concrete to harden enough to make edge cuts and control cuts.				
(Note: Control cuts should be made in such a manner that they create equal sections on the surface.)				

7. Use hammer to tap on forms to insure that concrete has settled compactly along the forms. _____

8. Place knee boards on surface to support body weight on soft concrete. Use wooden hand trowel over entire surface to work down coarse rock and raise sand and cement to top. _____

9. Allow concrete to set to a rather hard consistency. _____

10. When mix will support body weight, use steel trowel and finish the surface in a circular motion. Trowel until surface is smooth. _____

11. After finishing, prevent rapid curing of the concrete by applying a fine spray mist of water. Periodically reapply mist to keep concrete damp until curing process is complete. _____

    (Note: This slow-drying process produces the best quality concrete.)

12. Have instructor check your work. _____

13. As directed by instructor, prepare for next job sheet or clean up area and return tools and materials. _____

Average of above evaluations* _____

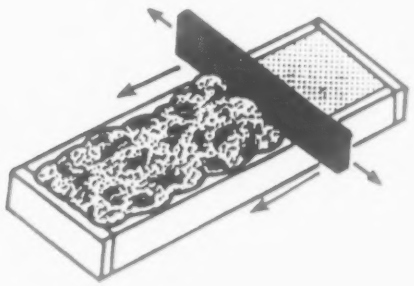
*This average is the student's partial evaluation for competency H-5 of Building Maintenance.

POUR AND FINISH FLAGSTONE

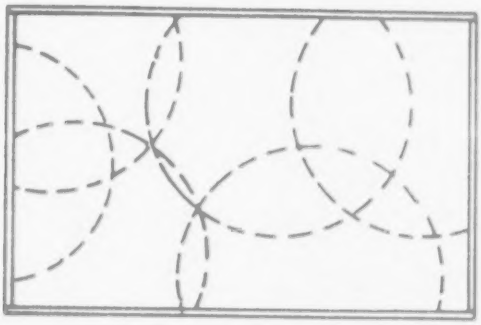
Equipment:

Prepared concrete (from job sheet in lesson 3)
Wheelbarrow
Shovel
Hammer
Screed
Cement edger
Trowel

Procedure	Evaluation 3	2	1	N
1. Prepare concrete.				
(Note: See job sheet in lesson 3.)				
2. Pour the mix into formed area.				
3. Vibrate by striking without moving form.				
4. Screed surface of concrete.				



5. Trowel surface of concrete in overlapping semi-circles. _ _ _ _ _



6. Edge, using cement edger. _ _ _ _ _

7. Trowel again, if necessary. _ _ _ _ _

8. Clean tools and equipment. _ _ _ _ _

9. Pull duplex nails from form (when concrete has hardened). _ _ _ _ _

10. Tap stakes from side to side until loose in soil. _ _ _ _ _

11. Pull stakes out of ground. _ _ _ _ _

12. Tap forms and remove from flagstone. _ _ _ _ _

13. Push loose dirt into stake holes with shovel. _ _ _ _ _

14. Have instructor check your work. _ _ _ _ _

15. As directed by instructor, prepare for next job sheet or clean up area and return tools and materials. _ _ _ _ _

Average of above evaluations* _ _ _ _ _

*This average is the student's partial evaluation for competency H-4 of Building Maintenance.

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 5: POUR AND FINISH CONCRETE

LESSON TEST

Part 1. Match the terms associated with concrete pouring and finishing to the correct definition by placing the letter of each term below in the correct blank.

A.	Vibrating	AD.	Edging
B.	Troweling	AE.	Pouring
C.	Curing	BC.	Finishing
D.	Jointing	BD.	Screeding
E.	Floating	BE.	Knee boards
AB.	Jitterbugging	CD.	Site
AC.	Screed	CE.	Spreaders

____ 1. A straight piece of material, such as a 2" x 4" board, that is used to level the surface of wet concrete

____ 2. Boards that are used by the concrete workers to kneel on while working wet concrete

____ 3. Place where concrete will be poured

____ 4. Placing mixed concrete into the forms

____ 5. Removing air bubbles from wet concrete

____ 6. Leveling the surface of wet concrete immediately after pouring

____ 7. Pushing the gravel below the surface of wet concrete

____ 8. Bringing water and cement to the surface of a slab

____ 9. Putting the final shape and surface on uncured concrete

____ 10. Putting grooves in a slab to control cracking

____ 11. Rounding the edge of a slab to prevent chipping or damage

____ 12. Smoothing the surface on concrete

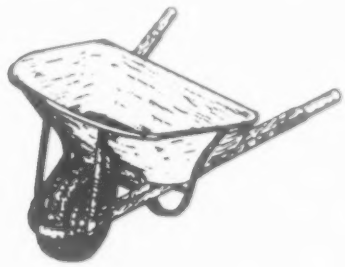
____ 13. A process within the concrete that makes it solid

____ 14. Wood or metal strips used to keep forms spread apart

Part 2. Identify the tools used for working concrete by writing the letter of the correct name in each blank.

A. Wheelbarrow
B. Shovel
C. Jitterbug
D. Bullfloat
E. Concrete placer
AB. Knee pads

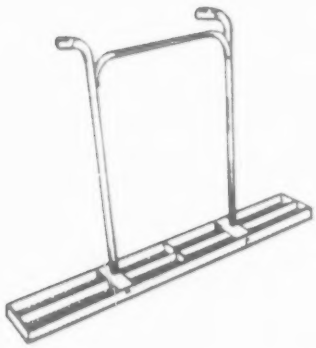
____ 15.



____ 16.

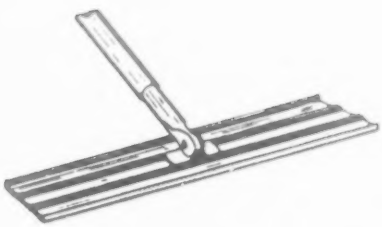
____ 17.

____ 18.



____ 19.

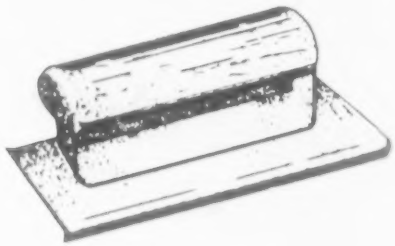
____ 20.



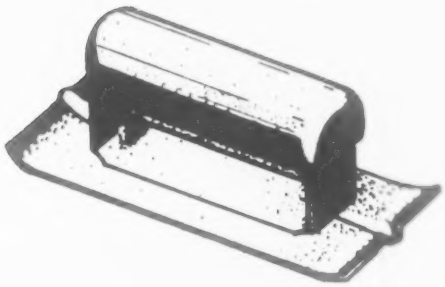
Part 3. Identify the tools used to finish concrete by writing the letter of the name in the correct blank.

A. Inside corner trowel
B. Outside corner trowel
C. Cement edger
D. Groover
E. Hand trowel
AB. Power trowel

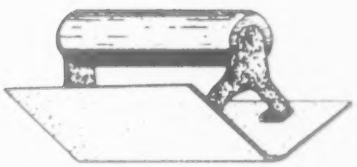
____ 21.



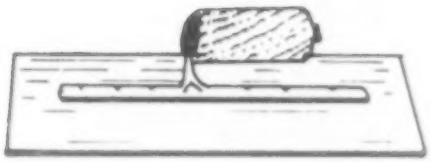
____ 22.



____ 23.



____ 24.



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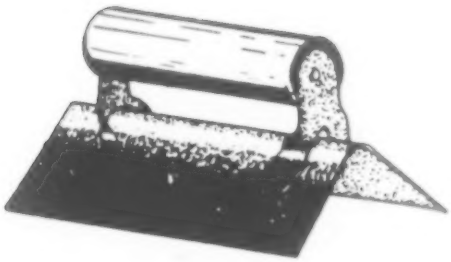

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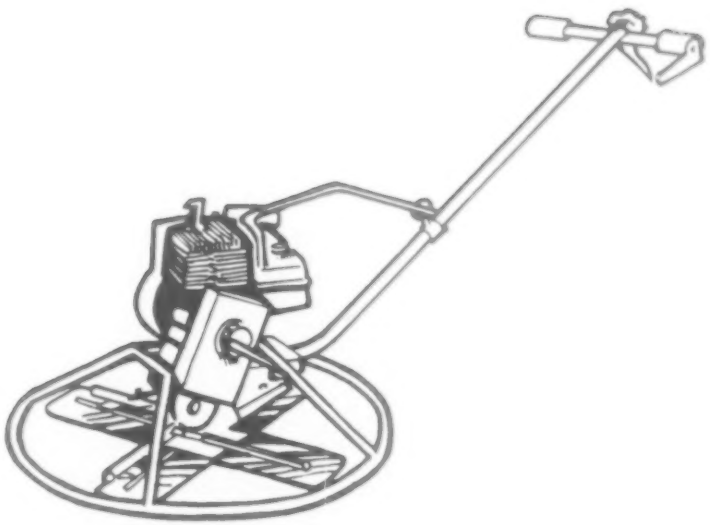


MODULE: MASONRY PROCEDURES

ANSWERS TO UNIT I, LESSON 5 TEST

Part 1.

1.	AC	4.	AE	7.	AB	10.	D	13.	C
2.	BE	5.	A	8.	E	11.	AD	14.	CE
3.	CD	6.	BD	9.	BC	12.	B		

Part 2.

15.	A	17.	E	19.	AB
16.	B	18.	C	20.	D

Part 3.

21.	C	24.	E
22.	D	25.	B
23.	A	26.	AB

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 6: MIX MORTAR

LESSON OBJECTIVE

After completion of this lesson, the student will be able to IDENTIFY TYPES OF MORTAR AND PREPARE A MORTAR MIX. Mastery will be evidenced by completion of job sheet and by scoring _____ percent on the lesson test.

SPECIFIC OBJECTIVES

In completing this lesson, the student will:

1. Match terms associated with mortar preparation to their correct definitions.
2. Identify types of mortar mixtures.
3. Point out things a worker should consider when mixing mortar.
4. Prepare a mortar mix.

Completion of the requirements of this lesson fulfills competency H-6 of Building Maintenance.

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 6: MIX MORTAR

CONTENTS OF LESSON

A. Objectives

B. Information outline

C. Transparency master
   1. Methods of mixing mortar

D. Job sheet
   1. Preparing a mortar mix

E. Lesson test

F. Answers to lesson test

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 6: MIX MORTAR

INFORMATION OUTLINE

I. Terms and definitions

A. Mortar--a mixture of portland cement, lime, sand, and water used for bonding brick

B. Caustic--any material that can cause burns by chemical reaction, such as acid

C. Lime--a caustic material used in making mortar mix

D. Masonry cement--pre-mixed portland cement and lime used in making mortar

E. Plastic mortar--mortar that has just been mixed

F. Slump--the settling action of plastic mortar

G. Above grade--above the level of the ground

H. Below grade--below the level of the ground

I. Pre-mix--two or more ingredients mixed and packaged by the manufacturer

J. Bond--to hold together

K. Compress--to push together

L. Consistency--how firm or watery the mortar is

II. Types of mortar mix

A. Pre-mixed
   1. Consists of portland cement and lime in correct ratio
   2. Needs only sand and water added to become mortar

B. On-the-job
   1. Type M
      a. Has high compressive strength
      b. Used for exterior and below-grade work

2. Type S
   a. Has high bonding strength
   b. Used for exterior and below-grade work
3. Type N
   a. Used for general purposes
   b. Highly weather resistant
   c. For above-grade use only
4. Type O
   a. Has low strength
   b. Used for interior work only
5. Type K
   a. Has very low strength
   b. Used for interior work only
   c. Will not support a load

III. Mortar materials

A. Sand
   1. Cleanliness
      a. Must be clean, free of trash, dirt and rocks
      b. Will not bond if dirty
   2. Sharpness
      a. Must be sharp-edged to bond
      b. Will slump and not bond if round
   3. Size
      a. Should have different sizes of sand mixed together
      b. Small sizes fill in between larger sizes

MAGNIFIED VIEW OF SAND

B. Water
   1. Must be clean
   2. Will make weak mortar dirty

IV. Mortar mix formulas

A. Pre-mixed
   1. One part mortar mix
   2. Three parts sand and water

B. On-the-job mix

PARTS BY VOLUME			
TYPE	PORTLAND CEMENT	HYDRATED LIME	SAND
M	1	1/4	2 1/2 to 3
S	1	1/4 to 1/2	times the total
N	1	1/2 to 1 1/4	amount of
O	1	1 1/4 to 1 1/2	cement and lime
K	1	2 1/2 to 4	

V. Methods of mixing (TM 1)

A. Using power mixer
   1. Follow the table for correct amounts of each mortar part
   2. Follow proper procedure for adding and mixing mortar parts
   3. Do not put shovel in mixer while mixer is turning

B. Hand mixing
   1. Follow the table for correct amounts of each mortar part
   2. Follow proper procedures for adding and mixing mortar parts
   3. Do not overfill mortar box

VI. Caring for mixed mortar

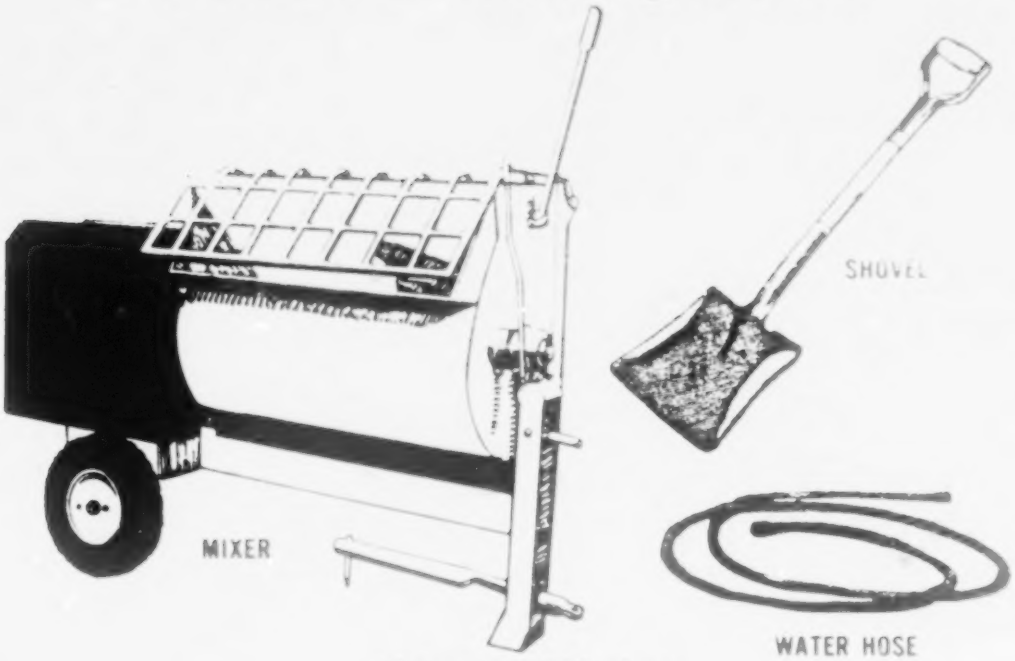
A. Keep mortar in a tight pile

B. Sprinkle lightly with water in very hot weather

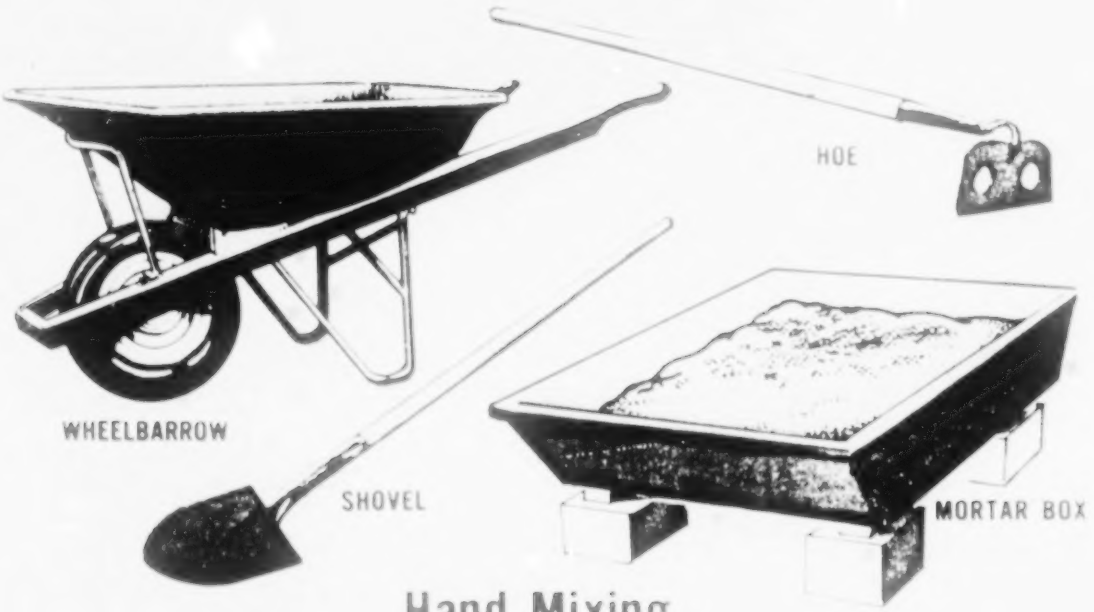
C. Re-mix every 5 to 10 minutes to keep proper consistency

D. Wet mortar boards to keep board from drawing water from mortar

Methods of Mixing Mortar



Power Mixing



Hand Mixing

PREPARING A MORTAR MIX

Equipment:

Mortar box
Shovel
Sand
Power mortar mixer
Mortar hoe
Mortar mix
Water

Procedure:

Evaluation
3 2 1 N

Preparing the mortar mix by hand

1. Determine the correct amount of mortar mix, lime, and sand. _ _ _ _
2. Place one-half of sand needed in a clean, dry mortar box. _ _ _ _
3. Place mortar mix on the sand. _ _ _ _
4. Mix the sand and mortar well, using the mortar hoe. _ _ _ _
5. Move all of the mixture to one end of the box, using the mortar hoe. _ _ _ _
6. Add water to the empty end of the box. _ _ _ _
7. Mix the dry mixture into the water. _ _ _ _

   (Note: This mixing may be called "cut" because of the chopping action used.)

8. Add water while mixing until mortar is the proper consistency. _ _ _ _
9. Let mortar stand for five minutes. _ _ _ _
10. Mix again. _ _ _ _

    (Note: To test for proper consistency, drag the tip of the trowel through the mortar. The "V" formed by the trowel should not slump and the mortar surface should be smooth.)

11. After mortar is mixed, ask instructor for further instructions. _ _ _ _ _

Preparing mortar mix with power mixer

12. Pour small amount of water into the mixer. _ _ _ _ _

13. Start the mixer motor. _ _ _ _ _

14. Add one-third of sand needed. _ _ _ _ _

15. Slowly add all of the mortar mix. _ _ _ _ _

16. Add one or two shovels of sand and then a little more water. _ _ _ _ _

17. Continue as in step 16 until all of the correct amount of sand is in the mixer. _ _ _ _ _

18. Add water until mortar is of proper consistency. _ _ _ _ _

(Note: Instructor will want to check for consistency of mortar.)

19. Dump mortar from mixer. _ _ _ _ _

20. Ask instructor about mortar use. _ _ _ _ _

21. Fill mixer one-fourth full of water. _ _ _ _ _

22. Run mixer until paddles are clean. _ _ _ _ _

23. Dump the water into proper container. _ _ _ _ _

24. Rinse inside of mixer with water, using hoe. _ _ _ _ _

25. Rinse mortar from all tools. _ _ _ _ _

26. Have instructor check your work. _ _ _ _ _

27. Wash cement from your hands. _ _ _ _ _

28. As directed by instructor, prepare for next job sheet or clean up area and return tools and materials. _ _ _ _ _

Average of above evaluations* _ _ _ _ _

*This average is the student's partial evaluation for competency H-6 of Building Maintenance.

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 6: MIX MORTAR

LESSON TEST

Part 1. Match the terms associated with mortar preparation to the correct definition by placing the letter of each term below in the correct blank.

A.	Plastic mortar	AC.	Consistency
B.	Above grade	AD.	Compress
C.	Pre-mix	AE.	Slump
D.	Masonry cement	BC.	Lime
E.	Bond	BD.	Caustic
AB.	Below grade	BE.	Mortar

____ 1. A mixture of portland cement, lime, sand, and water used for bonding brick

____ 2. Any material that can cause burns by chemical reaction, such as acid

____ 3. A caustic material used in making mortar mix

____ 4. Pre-mixed portland cement and lime used in making mortar

____ 5. Mortar that has just been mixed

____ 6. The settling action of plastic mortar

____ 7. Above the level of the ground

____ 8. Below the level of the ground

____ 9. Two or more ingredients mixed and packaged by the manufacturer

____ 10. To hold together

____ 11. To push together

____ 12. How firm or watery the mortar is

Part 2. Match the types of mortar mix below with the correct definition.

A.	Type N	D.	Type K
B.	Pre-mixed	E.	Type M
C.	Type O	AB.	Type S

____ 13. a. Consists of portland cement and lime in correct ratio
b. Needs only sand and water added to become mortar

____ 14. a. Has high compressive strength
b. Used for exterior and below-grade work

____ 15. a. Has high bonding strength
b. Used for exterior and below-grade work

___ 16. a. Used for general purposes
b. Highly weather resistant
c. For above-grade use only

____ 17. a. Has low strength
b. Used for interior work only

____ 18. a. Has very low strength
b. Used for interior work only
c. Will not support a load

Part 3. Point out the things that the worker should consider when mixing mortar by placing an "X" in front of each correct item.

____ 19. The cleanliness of the sand

____ 20. The weight of the sand

____ 21. The cleanliness of the water

____ 22. The ratio for mixing the mortar materials

____ 23. The method used for mixing

____ 24. The height of the power mixer

____ 25. The moisture content of the mix

____ 26. The affect of hot weather on the mortar mix

MODULE: MASONRY PROCEDURES

ANSWERS TO UNIT I, LESSON 6 TEST

Part 1.

1.	BE	5.	A	9.	C
2.	BD	6.	AE	10.	E
3.	BC	7.	B	11.	AD
4.	D	8.	AB	12.	AC

Part 2.

13.	B	16.	A
14.	E	17.	C
15.	AB	18.	D

Part 3.

19. X
20.
21. X
22. X
23. X
24.
25. X
26. X

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 7: REMOVE, REPAIR AND/OR REPLACE BRICK AND BLOCK

LESSON OBJECTIVE

After completion of this lesson, the student will be able to REPAIR OR REPLACE BRICK AND CONCRETE BLOCK. Mastery will be evidenced by completion of job sheets and by scoring _____ percent on the lesson test.

SPECIFIC OBJECTIVES

In completing this lesson, the student will:

1. Identify terms related to masonry work.
2. Identify types of masonry joints.
3. Identify brick positions.
4. Identify types of brick courses.
5. Identify types of brick bonds.
6. Supply a mortar stand with mortar.
7. Spread mortar.
8. Lay a corner lead six courses high.
9. Complete a wall between corner leads.

Completion of the requirements of this lesson fulfills competencies H-7 and H-8.

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 7: REMOVE, REPAIR AND/OR REPLACE BRICK AND BLOCK

CONTENTS OF LESSON

A. Objectives

B. Information outline

C. Transparency masters
   1. Names of brick positions
   2. Kinds of brick courses
   3. Kinds of brick bonds
   4. Typical wall section
   5. With a window

D. Job sheets
   1. Supply a mortar stand with mortar
   2. Spread mortar
   3. Lay a corner lead six courses high
   4. Complete a wall between corner leads

E. Lesson test

F. Answers to lesson test

MODULE: MASONRY PROCEDURES

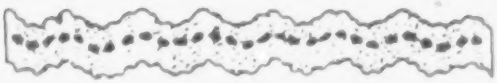
UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 7: REMOVE, REPAIR AND/OR REPLACE BRICK AND BLOCK

INFORMATION OUTLINE

I. Terms and definitions

A. Wall ties--metal strips used to hold a brick wall in place



B. Lead--the first part that is built in a masonry wall

C. Corner lead--building the corners of masonry walls

D. Closure brick--the last brick laid in a course

E. Course--a layer of bricks, blocks, or stones in a masonry wall

F. Lintel--a support for courses above wall openings

G. Frieze board--a board that is used for trim along the top of the last course

H. Corner pole--any type of post that is propped and braced in a plumb position so a line can be fastened to it

II. Types of masonry joints

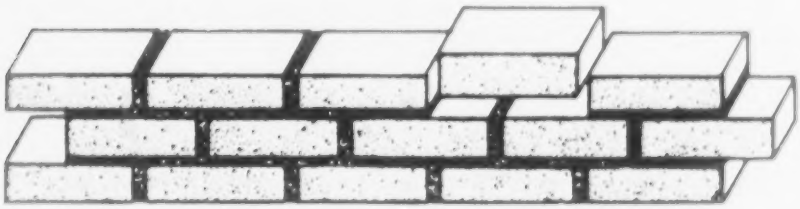
A. Bed joint--the horizontal mortar joint between each course

(Note: Do not lay more than 10 courses in a wall before mortar has begun to harden to prevent mortar from being pressed out of bottom joints)

B. Head joint--the vertical mortar joint between the ends of each brick or block

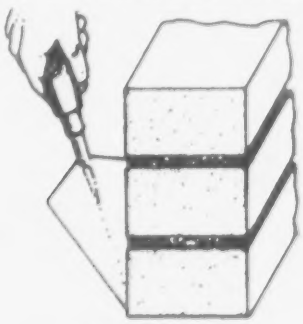
C. Closure joint--the mortar joint between the last brick laid in a course

(Note: Check the last brick to be laid in a course for fit before applying mortar to closure joint)

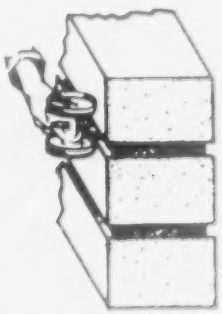


III. Types of masonry joint finishes

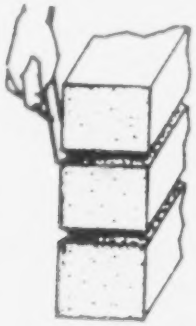
A. Flush--mortar is removed with edge of trowel, leaving joint even with surface of brick



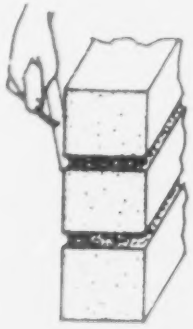
B. Raked--mortar is raked out of joint to a depth of 3/8 inch using a wheel joint raker



C. "V"-groove--mortar is smoothed into joint with either an "S"-shaped or sled runner tool with "V"-shape edge



D. Concave--mortar is smoothed into joint with either an "S"-shaped or sled runner tool with "U"-shaped edge



IV. Names of brick positions (TM 1)

A. Stretcher

B. Header

C. Sailor

D. Soldier

E. Rowlock

F. Rowlock stretcher

V. Kinds of brick courses (TM 2)

A. Stretcher--the straight running courses in a wall

(Note: Stretcher courses are also called bond courses)

B. Soldier
1. Brick stood on end to finish top wall
2. Allows for stretcher courses to be laid to the window openings
3. Allows for top courses to be laid to the frieze board

C. Header
1. Courses that are turned crosswise in a double wall
2. Tie double walls together every sixth course
3. Used to cap the top of a double wall

D. Rowlock
1. Bricks are turned on edge
2. Used to cap double walls
3. Used to make window sills

VI. Kinds of brick bonds (TM 3)

A. American

(Note: Also known as running bond)

B. Flemish

C. English

D. Stack

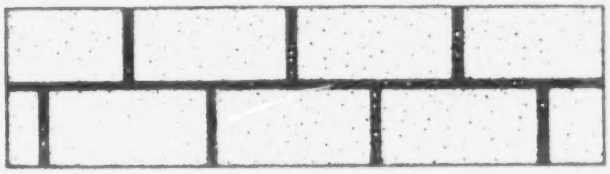
E. Common bond--sixth course headers

VII. Concrete blocks

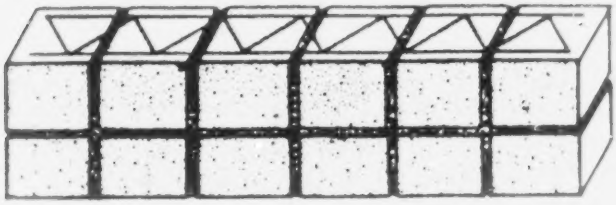
A. Joints--same as for brick

B. Bonds

1. Straight--should be laid with 1/2 overlap for maximum strength



2. Decorative
   a. Used for beauty
   b. Must be reinforced every second course



VIII. Considerations for laying corner leads (TM 4)

A. Corners are usually laid first when constructing a masonry wall

B. Set the corner pole in place and plumb this with the courses marked

C. Lay the stretcher course first without mortar to check the spacing

D. Mortar the corners in place first

E. Check for plumb and level as the corner is being laid

IX. Considerations for laying wall openings (TM 5)

A. Establish location of openings

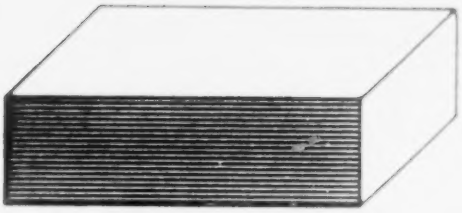
B. Determine the size and height of openings

C. Adjust the course spacing to match wall openings

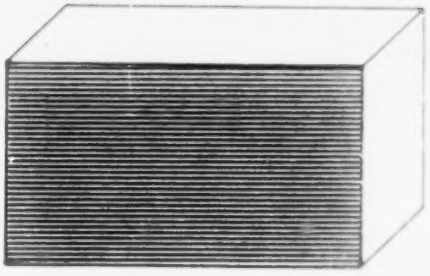
D. Use angle iron for lintels over wall openings

TM 1

Names of Brick Positions

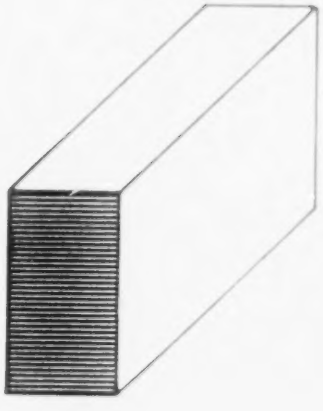


STRETCHER

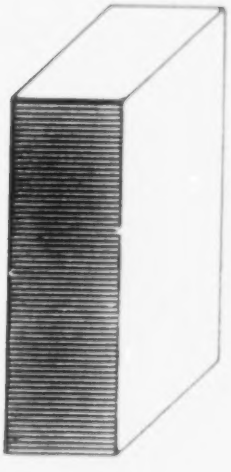


ROWLOCK STRETCHER

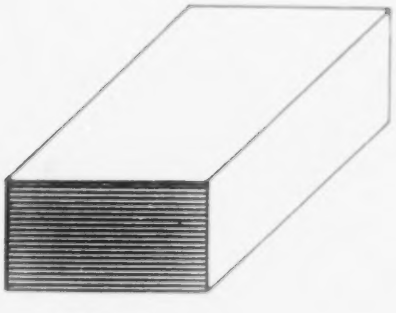
SAILOR



ROWLOCK



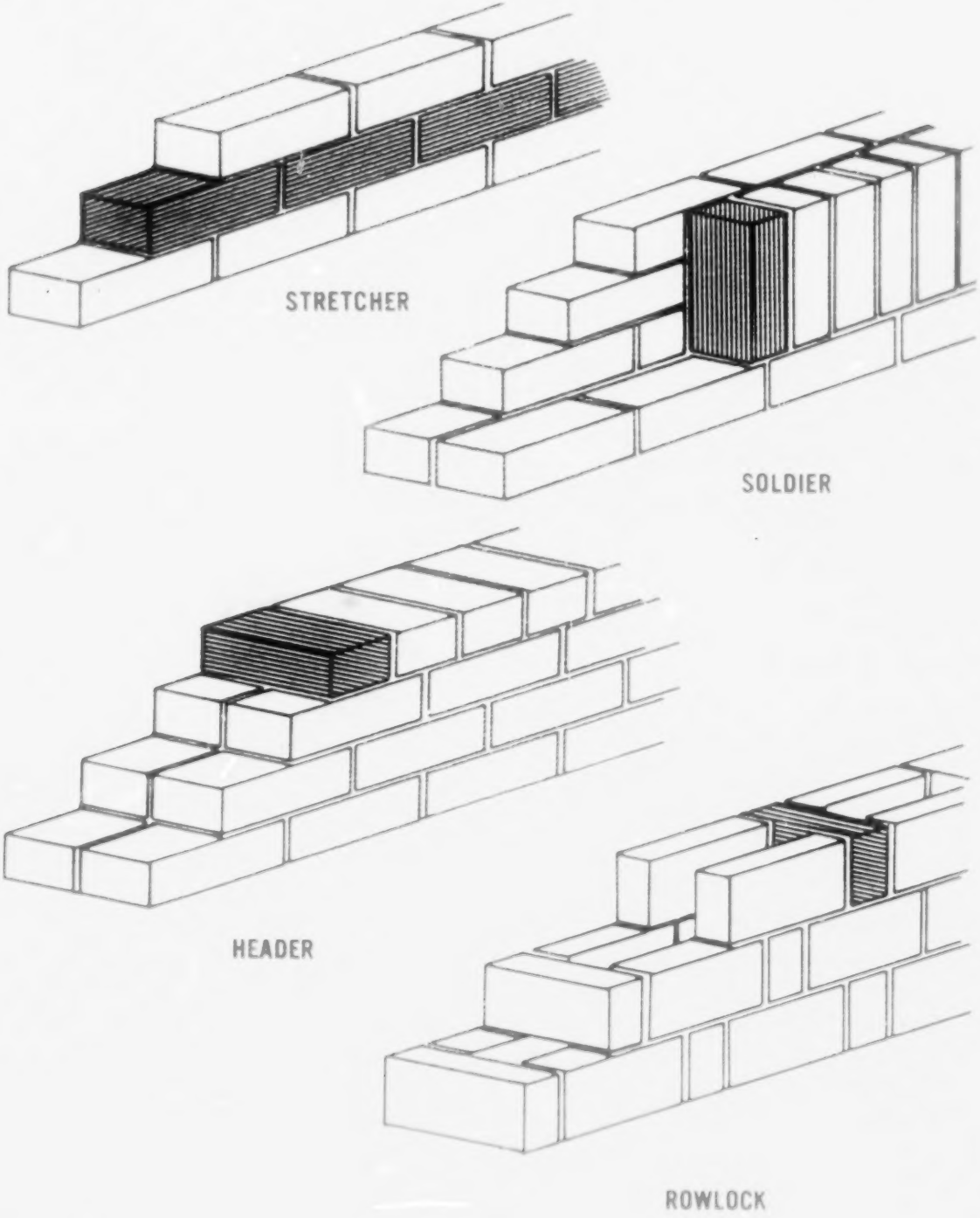
SOLDIER



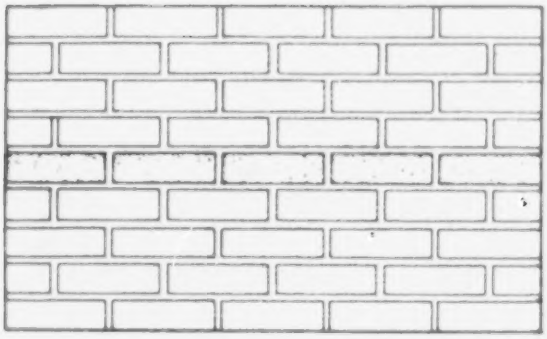
HEADER

TM 2

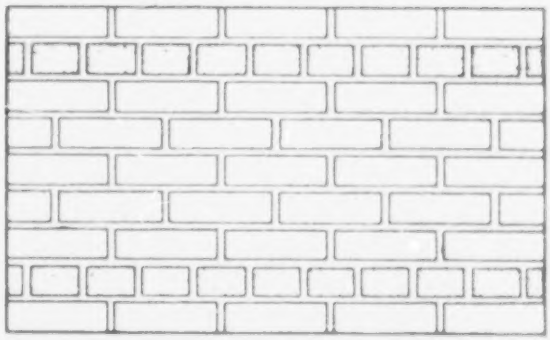
Kinds of Brick Courses



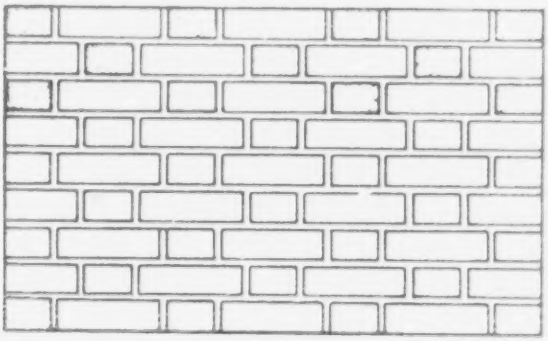
Kinds of Brick Bonds



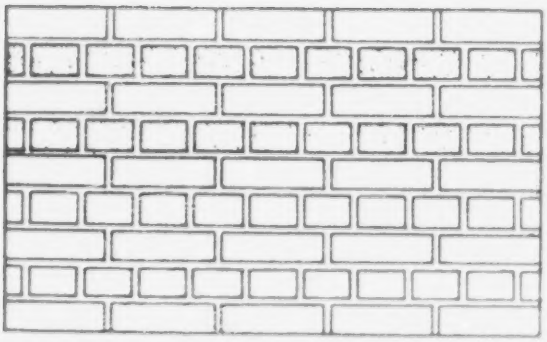
RUNNING BOND OR AMERICAN BOND



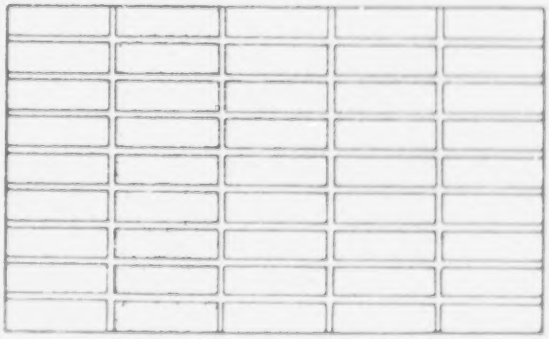
COMMON BOND - 6TH COURSE HEADERS



FLEMISH BOND

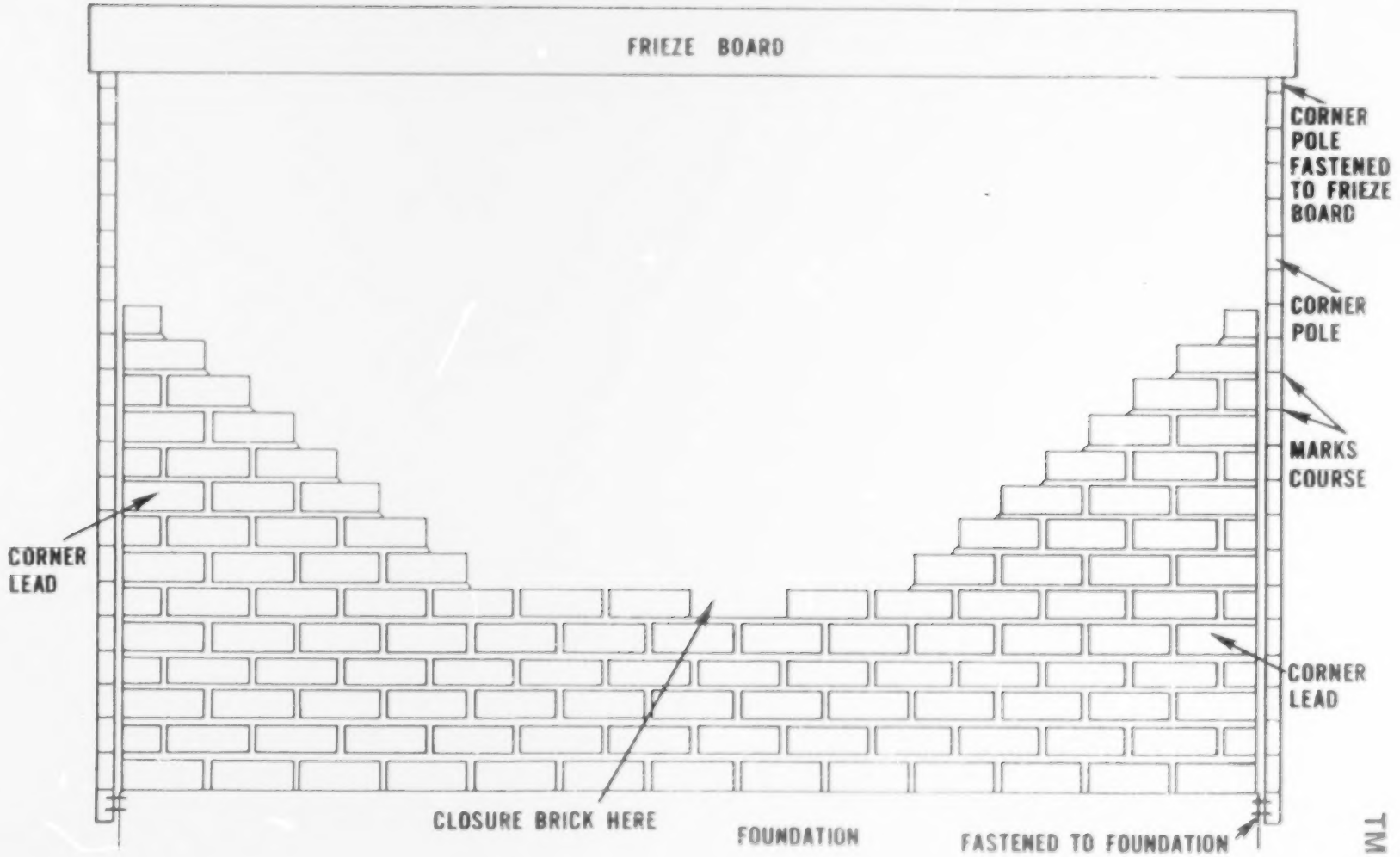


ENGLISH BOND



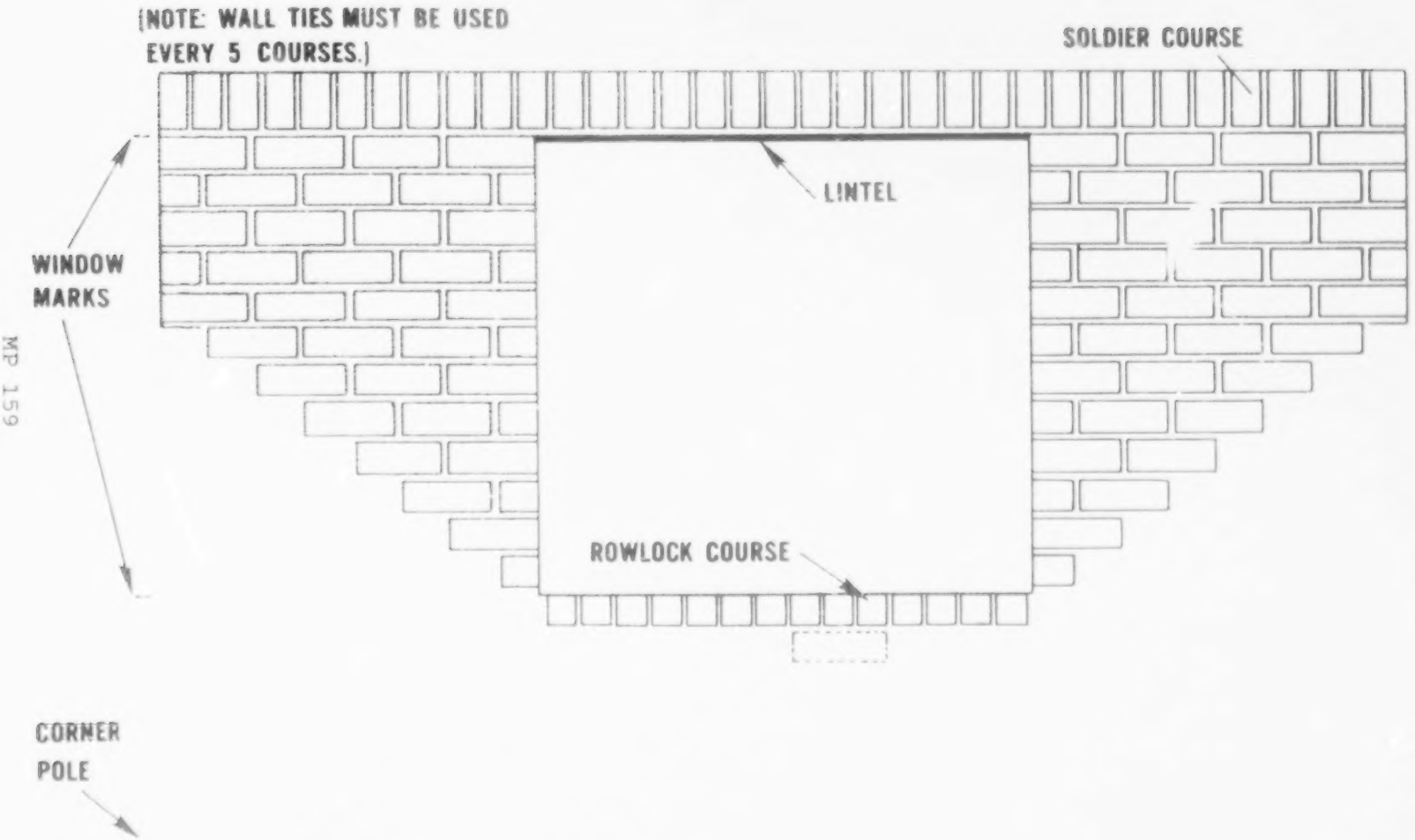
STACK BOND

Typical Wall Section



TM 4

With a Window



MP 159

TM 5

SUPPLY A MORTAR STAND WITH MORTAR

JS 1

Equipment:

Wheelbarrow
Shovel
Water in a bucket
Trowel
Mortar hoe
Mortar
Mortar stand

Procedure:

		Evaluation 3	2	1	N
1.	Re-mix the mortar in box with mortar hoe.				
2.	Wet the inside of wheelbarrow and dump excess water.				
3.	Fill the wheelbarrow 3/4 full of mortar using the shovel.				
4.	Push wheelbarrow to mortar stand location.				
5.	Wet the surface of the mortar stand.				
6.	Place three to four shovels of mortar onto the center of mortar stand.				
7.	Mound the mortar in the center of the stand using the trowel.				
8.	When mason uses mortar down to about one shovel, add more mortar to mortar board.				
9.	Mix fresh mortar with mortar still on the stand using the trowel.				
	(Note: Keep stand close to the mason but do not get in the way.)				
10.	Have instructor check your work.				
11.	Wash your hands.				
12.	As directed by instructor, prepare for next job sheet or clean up area and return tools and materials.				
	Average of above evaluations*				

*This average is the student's partial evaluation for competencies H-7 and H-8 of Building Maintenance.

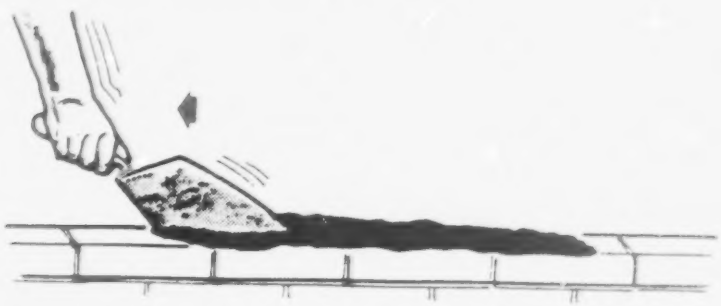
SPREAD MORTAR

Equipment:

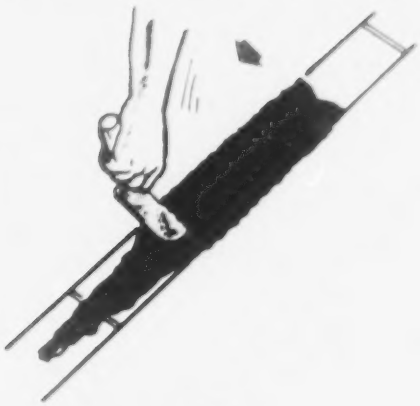
Trowel
Mortar stand
Mortar
Shovel
Row of bricks

Procedure:

		Evaluation 3	2	1	N
1.	Set up mortar stand.	_	_	_	_
2.	Place three to four shovels of mortar on stand.	_	_	_	_
3.	Grasp trowel loosely in hand at base of handle.	_	_	_	_
4.	Re-mix mortar on the stand.	_	_	_	_
5.	Scoop up a trowel full of mortar.	_	_	_	_
	(Note: Mortar is also called "mud" in the masonry trade.)				
6.	Place edge of trowel on top of brick row.	_	_	_	_
7.	Dump mortar while dragging trowel along the brick row.	_	_	_	_
	(Note: Row of mortar on brick should be about 2 1/2" wide and 2" deep on the brick row.)				



8. Dray tip of trowel through top of mortar row. _____



9. Lay brick and press into place. _____

10. Scrape excess mortar squeezed from bed with trowel. _____

11. Spread mortar left on trowel on the end of the brick just laid. _____

12. Repeat steps 2 through 11 until job is complete. _____

13. Have instructor check your work. _____

14. Wash your hands. _____

15. As directed by instructor, prepare for next job sheet or clean up area and return tools and materials. _____

Average of above evaluations* _____

*This average is the student's partial evaluation for competencies H-7 and H-8 of Building Maintenance.

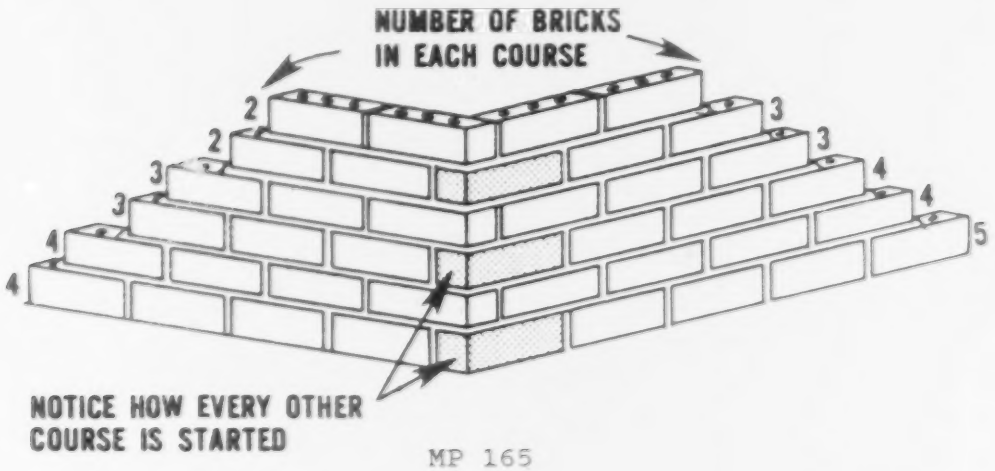
LAY A CORNER LEAD SIX COURSES HIGH

Equipment:

Trowel	Mason Level
Square	Masonry jointer
Broom	Mortar stand
Bricks	Mortar

Procedure:

		Evaluation 3	2	1	N
1.	Establish square corner lines for two corners.	_	_	_	_
2.	Lay first stretcher course without mortar to check spacing.	_	_	_	_
3.	Set up stand and fill with mortar.	_	_	_	_
4.	Lay mortar for bed joint.	_	_	_	_
5.	Start at the corner and lay a line of seven bricks in one direction.	_	_	_	_
	(Note: Be sure head joints are full of mortar.)				
6.	Start at first brick laid and lay seven bricks in the other direction.	_	_	_	_
	(Note: Be sure to keep line straight.)				
7.	Spread mortar on top of first course.	_	_	_	_
8.	Start at corner and lay another course, using drawing below for an example.	_	_	_	_



MP 165

9. Repeat procedure until corners are six courses high. _____

(Note: Be sure to check for plumb and level on each course.)

10. Finish all joints with the mason's jointer. _____

11. Brush off any mortar that may have dropped on the bricks with the broom. _____

12. Have instructor check your work. _____

13. Wash your hands. _____

14. As directed by instructor, prepare for next job sheet or clean up area and return tools and materials. _____

Average of above evaluations* _____

*This average is the student's partial evaluation for competencies H-7 and H-8 of Building Maintenance.

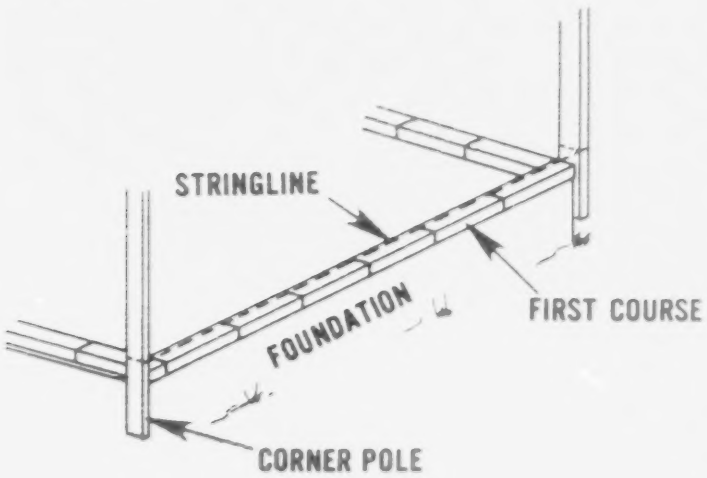
COMPLETE A WALL BETWEEN CORNER LEADS

Equipment:

Trowel	Mortar stand
Mason's line	Corner poles
Mason's jointer	Mortar
Bricks	

(Note: Corners built from previous job sheet will be used.)

Procedure:	Evaluation 3	2	1	N
1. Attach corner poles to corner leads.				
2. Plumb corner poles.				
3. Attach mason's line to corner poles and set for first course.				



4. Lay out bricks without mortar for first course to check spacing. _ _ _ _ _

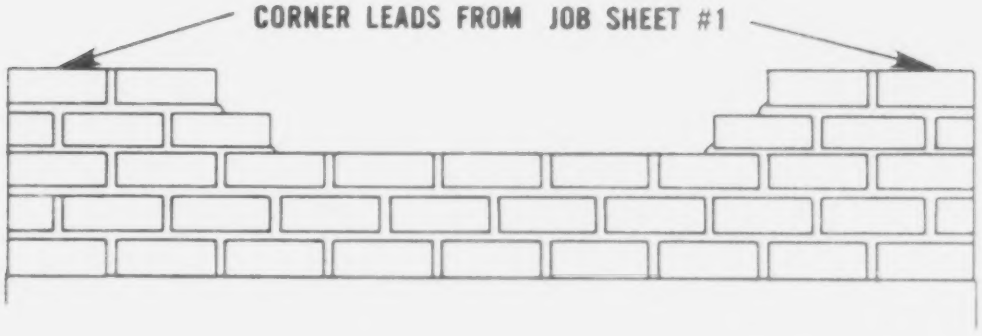
5. Set mortar stand nearby. _ _ _ _ _

6. Fill mortar stand with mortar. _ _ _ _ _

7. Lay mortar with trowel for first course. _ _ _ _ _

8. Lay first course. _ _ _ _ _

(Note: Be sure to fill head joints full of mortar.)



9. Lay five more courses before using jointer. _ _ _ _ _

10. Use mason's jointer on all joints. _ _ _ _ _

11. Clean wall with the broom. _ _ _ _ _

12. Wash your hands. _ _ _ _ _

13. Have instructor check your work. _ _ _ _ _

14. As directed by instructor, prepare for next job sheet or clean up area and return tools and materials.

Average of above evaluations* _ _ _ _ _

***This average is the student's partial evaluation for competencies H-7 and H-8 of Building Maintenance.**

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 7: REMOVE, REPAIR AND/OR REPLACE BRICK AND BLOCK

LESSON TEST

Part 1. Match the terms associated with wall construction to the correct definitions by placing the letter of each term in the blank.

A.	Closure brick	E.	Lintel
B.	Course	AB.	Lead
C.	Wall ties	AC.	Frieze board
D.	Corner pole	AD.	Corner lead

____ 1. Metal strips used to hold a brick wall in place

____ 2. The first part that is built in a masonry wall

____ 3. Building the corners of masonry walls first

____ 4. The last brick laid in a course

____ 5. A layer of bricks, blocks, or stones in a masonry wall

____ 6. A support for courses above wall openings

____ 7. A board that is used for trim along the top of the last course

____ 8. Any type of post that is propped and braced in a plumb position so a line can be fastened to it

Part 2. Match the type of masonry joint with its correct definition by placing the letter in the blank.

A.	Head joint	C.	Bed joint
B.	Closure joint		

____ 9. The horizontal mortar joint between each course

____ 10. The vertical mortar joint between the ends of each brick or block

____ 11. The mortar joint between the last brick laid in a course

Part 3. Match the type of masonry joint finishes below with their correct definitions by placing the letter in the blank.

A. Concave
B. "V"-groove
C. Flush
D. Raked

____ 12. Mortar is removed with edge of trowel, leaving joint even with surface of brick

____ 13. Mortar is raked out of joint to a depth of 3/8 inch using a wheel joint raker

____ 14. Mortar is smoothed into joint with either an "S"-shaped or sled runner tool with "U"-shaped edge

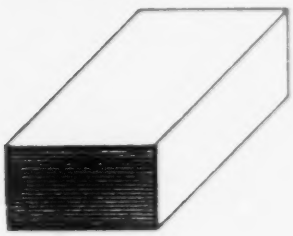
Part 4. Identify the brick positions. Select the correct name for each from the list below and write its number in the blank.

A. Stretcher
B. Header
C. Soldier
D. Sailor
E. Rowlock
AB. Rowlock stretcher

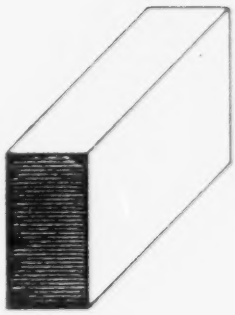
____ 15.

____ 16.

____ 17.



____ 18.



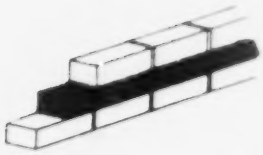
____ 19.

____ 20.

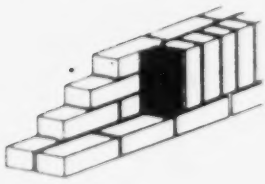
Part 5. Identify the kinds of brick courses. Select the correct name from the list below and write its letter in the blank beside the picture.

A. Header
B. Soldier
C. Stretcher
D. Rowlock

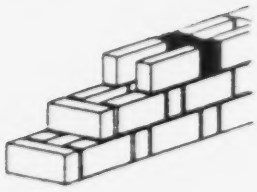
____ 21.



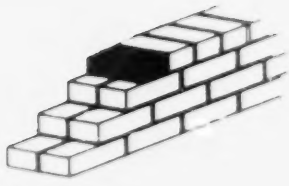
____ 22.



____ 23.



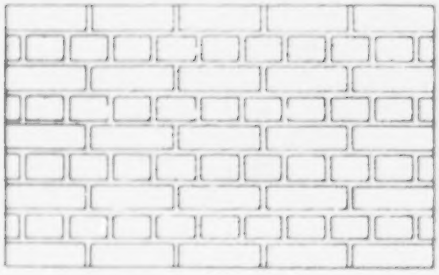
____ 24.



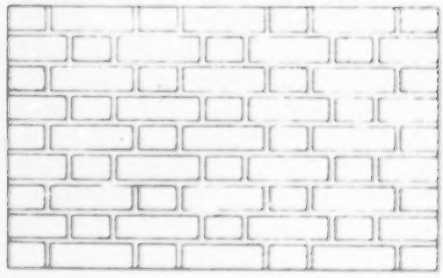
Part 6. Identify the brick bonds. Select the correct name from the list below and write it in the blank.

A. American
B. Flemish
C. English
D. Stack

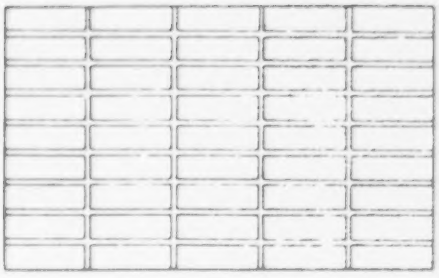
____ 25.



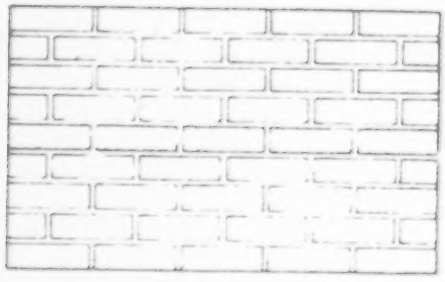
____ 26.



____ 27.



____ 28.



Part 7. Point out things to consider when laying a corner lead by placing an "X" in front of each correct statement.

____ 29. The corner pole is plumbed after it is set in place.

____ 30. Corners are always laid last.

____ 31. The stretcher course is laid without mortar to check spacing.

____ 32. Check for plumb and level as corner is laid.

Part 8. List two types of concrete block bonds.

33.

34.

MODULE: MASONRY PROCEDURES

ANSWERS TO UNIT I, LESSON 7 TEST

Part 1.

1.	C	3.	AD	5.	B	7.	AC
2.	AB	4.	A	6.	E	8.	D

Part 2.

9.	C	10.	A	11.	B

Part 3.

12.	C	13.	D	14.	B

Part 4.

15.	C	17.	B	19.	A
16.	AB	18.	E	20.	D

Part 5.

21.	C	22.	B	23.	D	24.	A

Part 6.

25.	C	26.	B	27.	D	28.	A

Part 7.

29.	X	30.		31.	X	32.	X

Part 8.

33. and 34. Straight and decorative (in either order)

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 8: INSTALL MASONRY ANCHORS

LESSON OBJECTIVE

After completion of this lesson, the student will be able to IDENTIFY AND INSTALL VARIOUS TYPES OF MASONRY ANCHORS. Mastery will be evidenced by completion of job sheet and by scoring _____ percent on the lesson test.

SPECIFIC OBJECTIVES

In completing this lesson, the student will:

1. Name four types of masonry anchors.
2. Identify specialized bolts.
3. Install lead shield anchor.
4. Suspend anchor bolts.

Completion of the requirements of this lesson fulfills competency H-9 of Building Maintenance.

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 8: INSTALL MASONRY ANCHORS

CONTENTS OF LESSON

A. Objectives

B. Information outline

C. Transparency masters
   1. Special anchors
   2. Masonry anchors
   3. Specialized bolts
   4. Specialized fasteners

D. Job sheets
   1. Install lead shield anchor
   2. Suspend anchor bolts

E. Lesson test

F. Answers to lesson test

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 8: INSTALL MASONRY ANCHORS

INFORMATION OUTLINE

I. Introduction

A. Masonry anchors are used to fasten things to walls, ceilings and floors

B. Masonry anchors are used in different trades such as carpentry, electric, plumbing, etc.--anywhere where items must be secured to a masonry surface

C. Fasteners must not loosen with vibration or stress

D. The item to be anchored determines the type of anchor to be used

II. Types of anchors used in masonry surfaces (TM 1, TM 2, TM 3, TM4)

A. Expansion shields
   1. Lead
   2. Plastic
      a. Line
      b. Tapered
   3. Lag

B. Threaded anchor
   1. Lead sleeve (caulking tool-set lead sleeve)

C. Tapered
   1. Plastic
   2. Lead
   3. Raw plug

D. Wedge shield
   1. Drive bolt (pre-drilled hole)

E. Tap-on bolt (pilot hole only needed)

F. Power nails and bolts

G. Toggle bolt (used in hollow block wall)

INSTALL LEAD SHIELD ANCHOR

Equipment:

Ruler or tape measure
Hammer
Lead shield anchor
Masonry electric carbide tip
Masonry bit (size for anchor)

Procedure:	Evaluation 3	2	1	N
1. Mark location where hole is to be.	__	__	__	__
2. Insert correct size drill bit in electric drill.	__	__	__	__
3. Locate bit on center of mark.	__	__	__	__
4. Turn on drill and drill hole to correct depth for anchor.	__	__	__	__
5. Remove bit from hole and check depth of hole.	__	__	__	__
6. Insert lead shield anchor in hole with flared end out.	__	__	__	__
7. Tap flared end with hammer until level with surface.	__	__	__	__
8. Fasten item to be anchored with correct size screw.	__	__	__	__
9. Have instructor check your work.	__	__	__	__
10. As directed by instructor, prepare for next job sheet or clean up area and return tools and materials.	__	__	__	__
Average of above evaluations*	__	__	__	__

*This average is the student's partial evaluation for competency H-9 of Building Maintenance.

SUSPEND ANCHOR BOLTS

Equipment:

Rule	Brace and Bit
Steel square	50-foot steel tape
Wrench	Hammer
Crosscut saw	

Procedure:

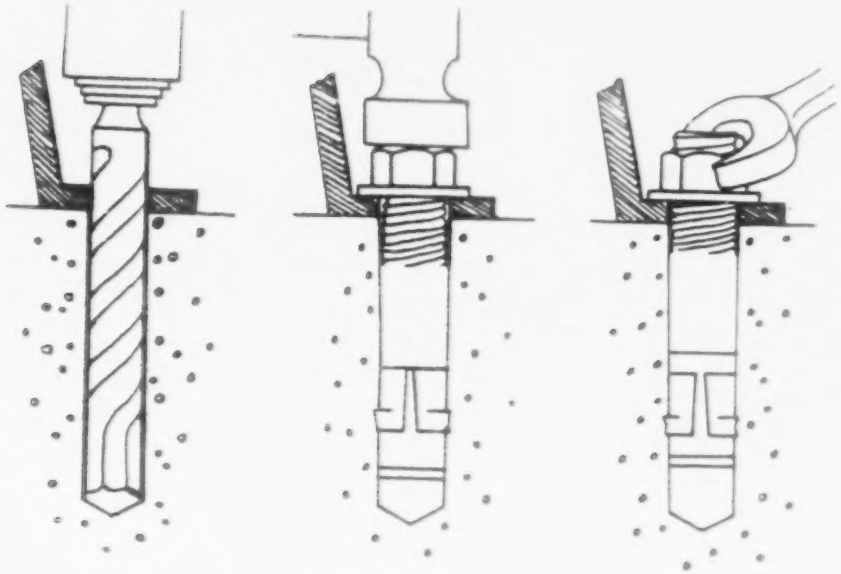
		Evaluation 3	2	1	N
1.	Snap a chalk line from one grade nail to the next, which makes a continuous line around the form.	_	_	_	_
2.	Cut the required number of pieces of sheathing 1 X 6 X 12 inches, which will suspend the anchor bolts until the concrete is set.	_	_	_	_
3.	Nail the bolt supports in place, centering the first from an outside corner.	_	_	_	_
	(Note: The underside of the board should be at the same elevation as the chalk line.)				
4.	Locate the first anchor bolt by measuring the desired distance in from the outside face of the wall along the center line of the piece of sheathing. Drive a nail at this point.	_	_	_	_
5.	Hook the ring of the steel tape over the nail and run the tape out and mark the form every 4 feet.	_	_	_	_
6.	Fasten the support boards at these marks.	_	_	_	_
7.	Locate the hole in each board as described in Step 4.	_	_	_	_
8.	Bore the holes at these points, allowing 1/6" for slippage of the bolt through the support.	_	_	_	_
9.	Slip the bolts into position.	_	_	_	_
10.	Run the nut and washer down on the bolt until there is a projection above the concrete line of the thickness of the sill plus 1/2".	_	_	_	_
11.	Have instructor check your work.	_	_	_	_

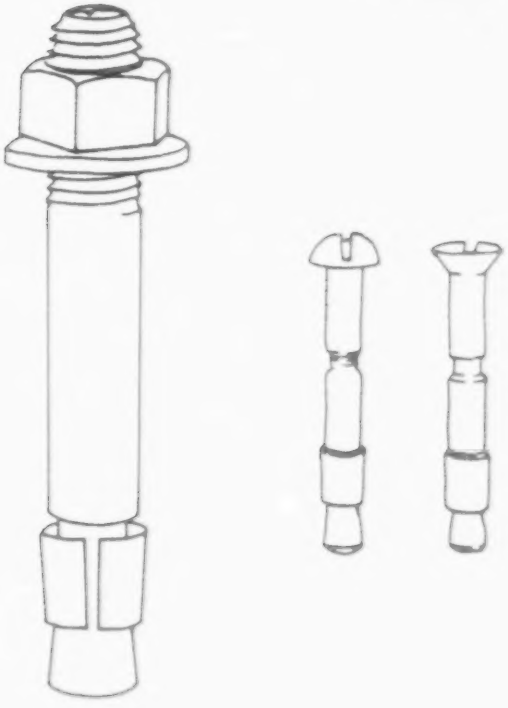
12. As directed by instructor, prepare for next job sheet or clean up area and return tools and materials. _____

Average of above evaluations* _____

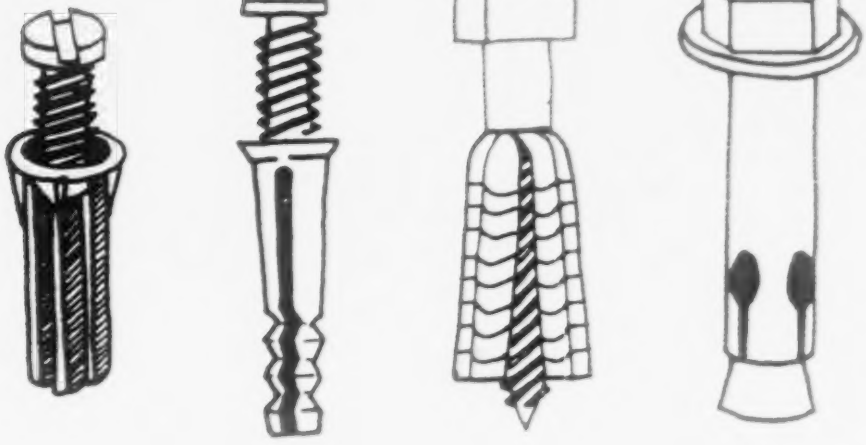
*This average is the student's partial evaluation for competency H-9 of Building Maintenance.

Special Anchors



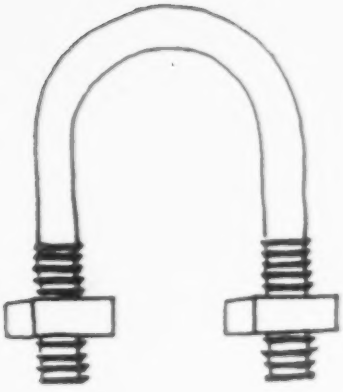


Masonry Anchors

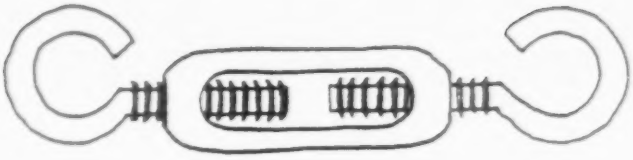


Lead Plastic Expansion Anchor

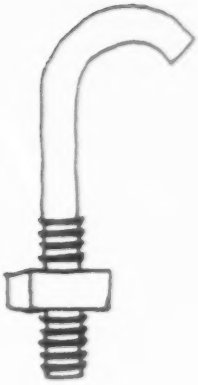
Specialized Bolts



U Bolt



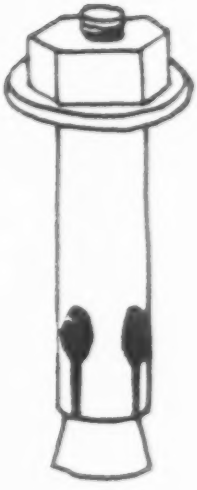
Turnbuckle



J Bolt

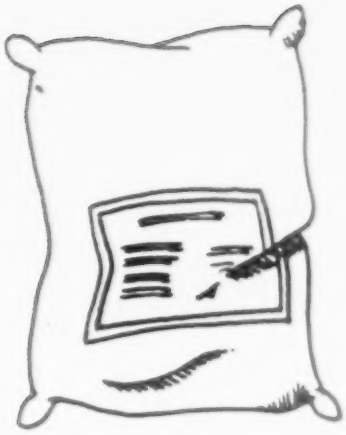
Eye

Expansion

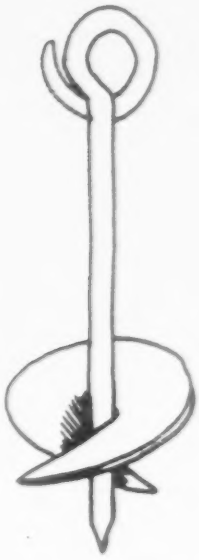


Anchor

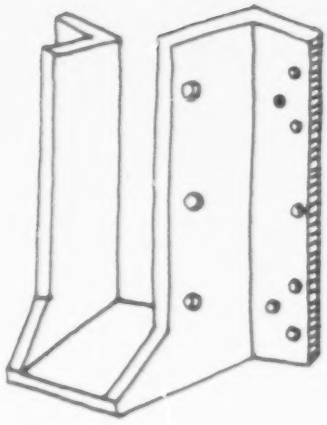
Special Fasteners



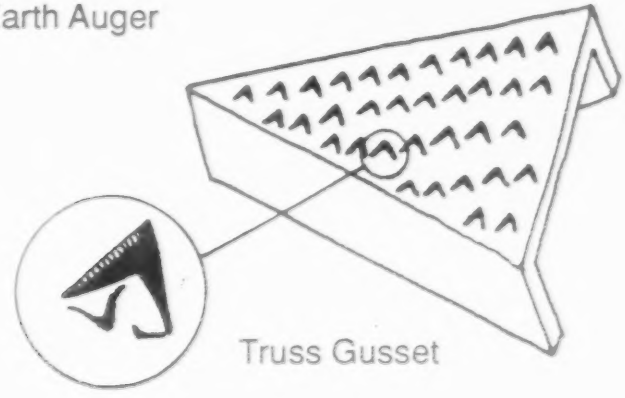
Anchoring Cement



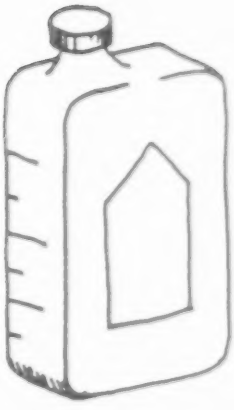
Earth Auger



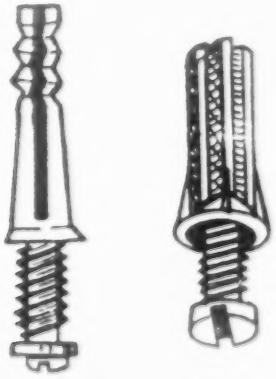
Joist Hanger



Truss Gusset



Glue



PLASTIC LEAD

Expansion Shields

MODULE: MASONRY PROCEDURES

UNIT I: PERFORMING MASONRY PROCEDURES

LESSON 8: INSTALL MASONRY ANCHORS

LESSON TEST

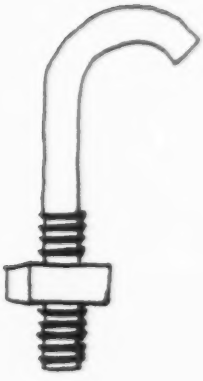
Part 1. Identify the specialized bolts pictured below by choosing the correct term from the list.

A. J Bolt
B. Eye
C. Expansion
D. U Bolt
E. Turnbuckle
AB. Anchor

____ 1.

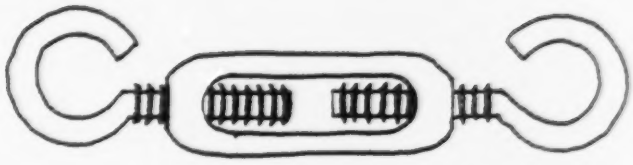
____ 2.

____ 3.

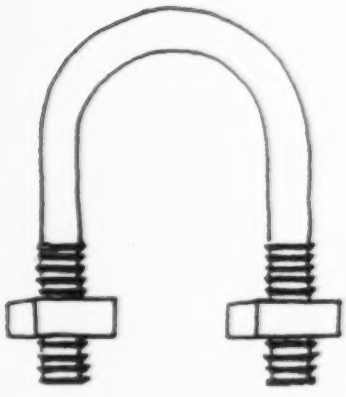


____ 4.

____ 5.



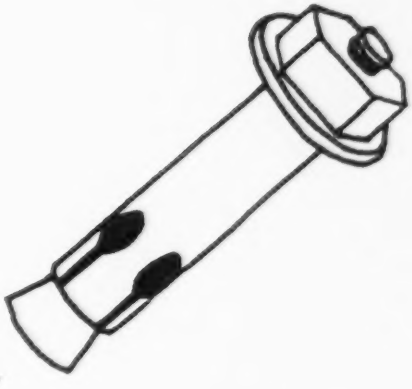
____ 6.



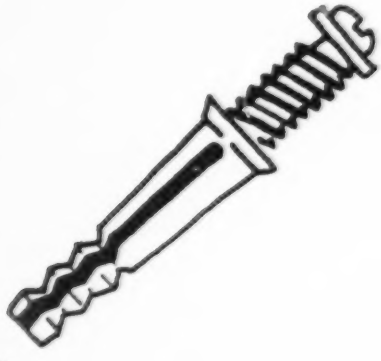
Part 2. Identify four types of masonry anchors pictured below by choosing the correct terms from the list.

A. Anchor
B. Lead
C. Expansion
D. Plastic

____ 7.



____ 8.



____ 9.

____ 10.

MODULE: MASONRY PROCEDURES

ANSWERS TO UNIT I, LESSON 8 TEST

Part 1.

1. B
2. AB
3. A
4. C
5. E
6. D

Part 2.

7. A
8. D
9. C
10. B